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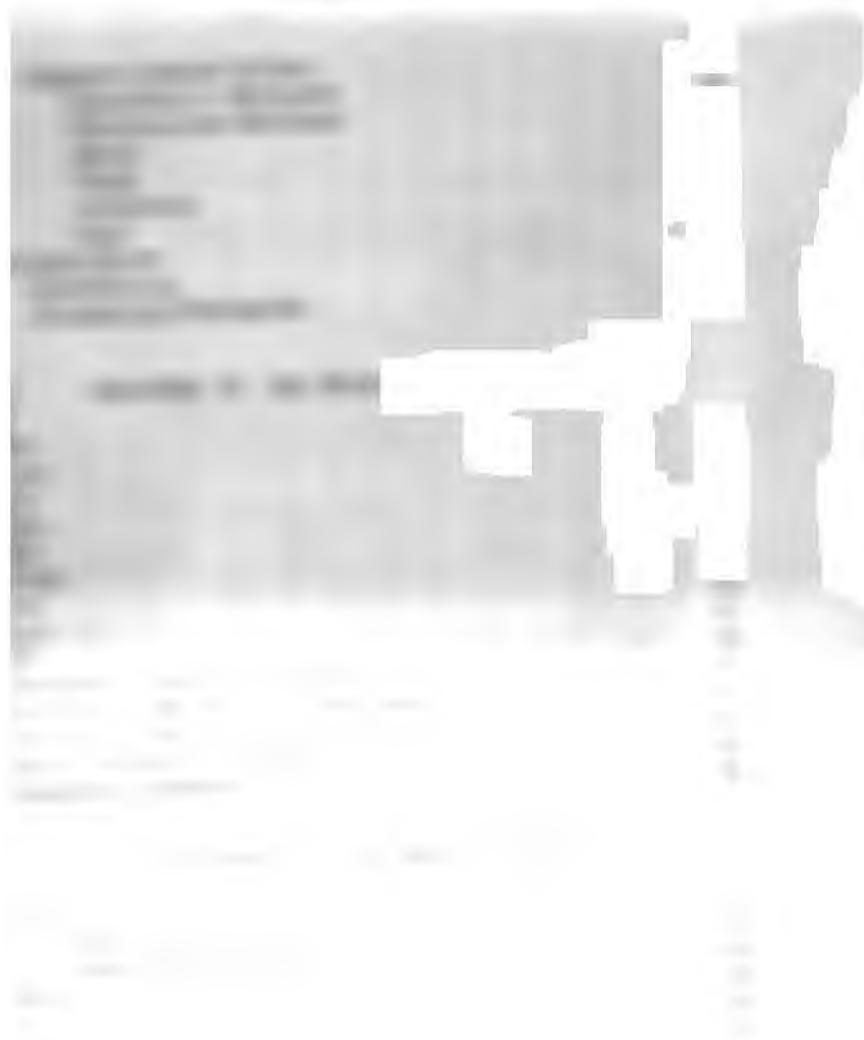
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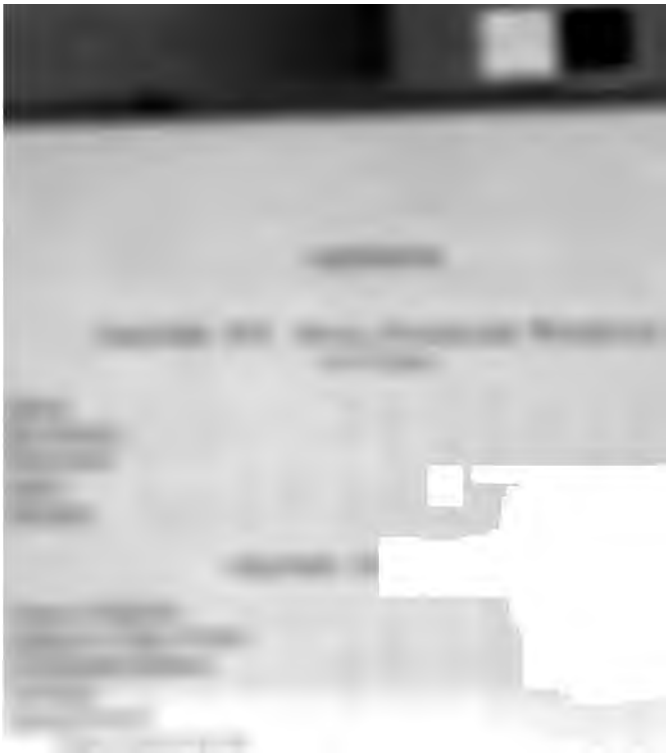
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RESEARCH REPORT

ANALYSIS OF THE DATA

The first part of the report discusses the methodology used in the study. This includes a description of the sample, the instruments used, and the procedures followed. The second part presents the results of the study, including the mean scores, standard deviations, and the results of the statistical tests. The third part discusses the implications of the findings and provides recommendations for future research.

1. Introduction
2. Method
3. Results
4. Discussion
5. Conclusion

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STATES AND TERRITORIES

State	Population	Area	Capital	Government
Alabama	2,048,000	52,400	Montgomery	Democratic
Alaska	267,000	368,000	Juneau	Republican
Arizona	1,309,000	113,900	Phoenix	Republican
Arkansas	1,045,000	53,100	Fayetteville	Democratic
California	15,981,000	158,000	Sacramento	Democratic
Colorado	2,766,000	104,000	Denver	Republican
Connecticut	3,287,000	5,500	Hartford	Democratic
Delaware	554,000	2,400	Dover	Democratic
Florida	13,932,000	57,900	Tallahassee	Republican
Georgia	4,448,000	59,700	Atlanta	Democratic
Hawaii	1,217,000	10,900	Honolulu	Democratic
Idaho	1,208,000	83,800	Boise	Republican
Illinois	12,812,000	143,000	Springfield	Democratic
Indiana	6,081,000	36,400	Indianapolis	Democratic
Iowa	2,922,000	56,300	Des Moines	Republican
Kansas	3,401,000	81,800	Topeka	Republican
Kentucky	4,046,000	40,400	Frankfort	Democratic
Louisiana	4,488,000	52,400	Baton Rouge	Democratic
Maine	1,329,000	9,300	Oxford	Democratic
Maryland	5,774,000	11,300	Annapolis	Democratic
Massachusetts	6,349,000	8,000	Boston	Democratic
Michigan	9,938,000	96,900	Lansing	Democratic
Minnesota	5,297,000	86,900	St. Paul	Republican
Mississippi	2,819,000	47,000	Jackson	Democratic
Missouri	5,938,000	69,700	Jefferson City	Democratic
Montana	989,000	147,000	Helena	Republican
Nebraska	1,926,000	77,300	Lincoln	Republican
Nevada	2,050,000	110,000	Carson City	Republican
New Hampshire	1,323,000	9,300	Manchester	Democratic
New Jersey	8,886,000	14,300	Trenton	Democratic
New Mexico	1,885,000	121,000	Santa Fe	Democratic
New York	19,045,000	54,500	Albany	Democratic
North Carolina	7,019,000	53,800	Raleigh	Democratic
North Dakota	688,000	70,700	Bismarck	Republican
Ohio	11,354,000	44,800	Columbus	Democratic
Oklahoma	3,756,000	69,000	Norman	Republican
Oregon	3,438,000	46,300	Salem	Democratic
Pennsylvania	12,464,000	46,000	Harrisburg	Democratic
Rhode Island	1,059,000	1,500	Providence	Democratic
South Carolina	3,538,000	32,000	Columbia	Democratic
South Dakota	801,000	77,000	Spearhead	Republican
Tennessee	5,688,000	42,000	Nashville	Democratic
Texas	20,504,000	695,000	Austin	Democratic
Vermont	623,000	9,600	Winooski	Democratic
Virginia	6,535,000	42,800	Richmond	Democratic
Washington	6,081,000	71,300	Olympia	Democratic
West Virginia	1,812,000	62,000	Charleston	Democratic
Wisconsin	5,791,000	65,500	Madison	Democratic
Wyoming	562,000	97,800	Cheyenne	Republican

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SCIENTIFIC METHODICAL CONSIDERATIONS

CHAPTER I

THE SCOPE OF THE SUBJECT

The scope of the subject is the study of the scientific method and its application to the study of the natural world. It is a study of the principles and methods of scientific inquiry, and of the ways in which these principles and methods have been applied to the study of the natural world.

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THE BIRTH OF A NATION

The story of the early years of the Republic of the United States.

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The first of these is the fact that the human body is not a simple machine, but a complex organism. It is not a mere collection of parts, but a whole. The human body is a complex system of organs and tissues, each of which has its own function to perform. The human body is a complex system of organs and tissues, each of which has its own function to perform. The human body is a complex system of organs and tissues, each of which has its own function to perform.



FIG. 1. A diagram illustrating the human body as a complex system of organs and tissues.

The second of these is the fact that the human body is not a static entity, but a dynamic one. It is constantly changing and adapting to its environment. The human body is a dynamic system of organs and tissues, each of which has its own function to perform. The human body is a dynamic system of organs and tissues, each of which has its own function to perform. The human body is a dynamic system of organs and tissues, each of which has its own function to perform.



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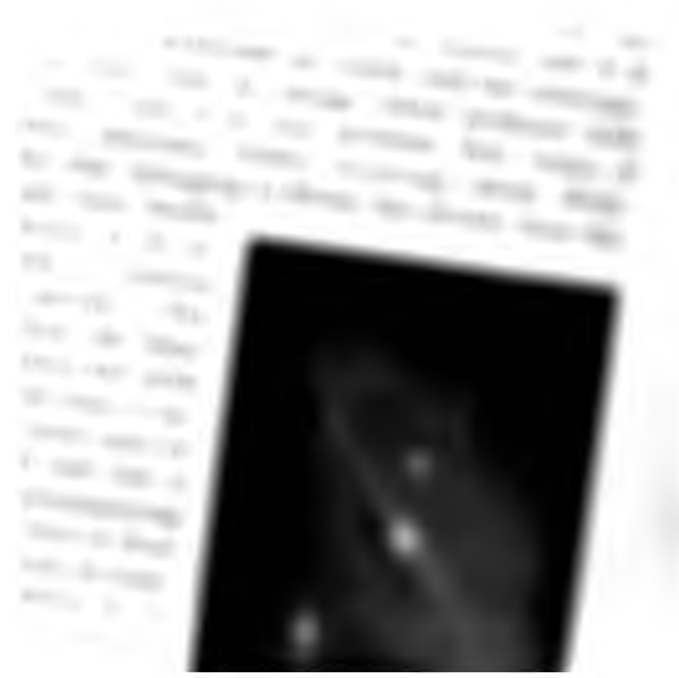
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2. The second part of the document is the main body of the article. It begins with a brief review of the literature on the subject, followed by a discussion of the author's own research. The author discusses the results of his research and compares them with the results of other studies. The author also discusses the implications of his research for the field of study.

3. The third part of the document is a conclusion. The author summarizes the main findings of his research and discusses the implications of these findings for the field of study. The author also discusses the limitations of his research and suggests areas for further research.

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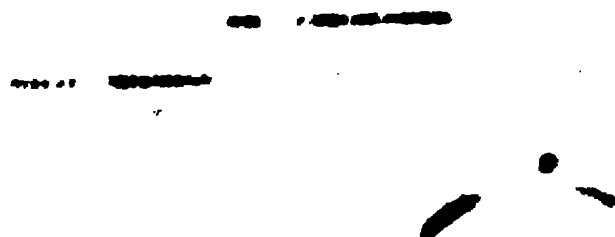
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the various countries, and some countries, such as the United States, the United Kingdom, and the Soviet Union, have been particularly active in the development of the world economy. The United States, for example, has been a major force in the development of the world economy, and the United Kingdom has been a major force in the development of the world economy. The Soviet Union, on the other hand, has been a major force in the development of the world economy, and the United States has been a major force in the development of the world economy.

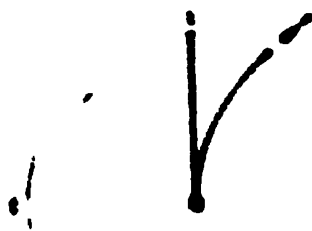
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The following table shows the results of the survey.

The following table shows the results of the survey.



be dedicated to the work as a result of the effect of
such a system. This will be a benefit to the nation
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In the meantime, however,
the students are being
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The system has been
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62

PHOTO AT 10:00 AM

Reference is made to the report of the Agent at the above
addressed to the Bureau dated 10/10/44.

and

REFERENCE MADE

The above information is the result of a telephone call to the

Director of the Bureau of Investigation, Washington, D. C., on 10/10/44.

It is requested that you advise the Bureau of the results of the
investigation conducted by you.

Very truly yours,
Special Agent in Charge

Enclosed for the Bureau are two copies of the report of the
Agent at the above address dated 10/10/44.

Very truly yours,
Special Agent in Charge

Enclosed for the Bureau are two copies of the report of the
Agent at the above address dated 10/10/44.

Very truly yours,

Very truly yours,

Very truly yours,

Very truly yours,

Very truly yours,

the case, and the divergence from the theoretical is due to the presence of a number of disturbing influences. These are: (1) the effect of atmospheric refraction; (2) the influence of the surface of the earth; and (3) the effect of topography.



Effect of Atmospheric Refraction

The refraction is again indicated by the change in the curve as it rises and falls. It is noted that the refraction is less at the greater distances. There is a regular variation in the refraction and

the refraction is less at the greater distances. There is a regular variation in the refraction and the refraction is less at the greater distances. There is a regular variation in the refraction and the refraction is less at the greater distances.

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temperature range throughout the year is very slight; and in temperate latitudes, while the range is much greater than this, it is still small compared with the range on the land (Fig. 24). Therefore near the seashore, the temperatures of the summer and the day are relatively low, while the temperatures of winter and the night are relatively high. Even on the shores of small lakes this influence of water is noticeable.

On those coasts which are reached by prevailing winds from the ocean, as on the west coast of the United States, the general temperature is high, and the climate equable. Even in a short distance the temperature difference may be very marked; and while on the shore the effect of the ocean is plainly felt, this influence becomes very much less marked at a distance of a few miles from the coast.

Coastal and upland differences of the ocean as they appear in the form that they take near the shore. Such waters and such winds are the cause of the difference of the sea and land in the temperature of different parts of the coast. The three main causes which these winds cause are the difference in the temperature of the water and the land, the difference in the temperature of the air and the water, and the difference in the temperature of the air and the land. These three causes are the cause of the difference in the temperature of the sea and land in the temperature of different parts of the coast.

The general character of the climate near the coast is the result of the difference in the temperature of the water and the land, the difference in the temperature of the air and the water, and the difference in the temperature of the air and the land. These three causes are the cause of the difference in the temperature of the sea and land in the temperature of different parts of the coast.

regard to temperature is also a consideration of great difference existing in the same region and is not a small one. In general, the temperature of the atmosphere is higher in the great mountain basins, where the air is not so much cooled down by the mountains as in the valleys, and the higher the mountains, the more the temperature is lowered. The influence of wind is also a consideration of great importance.

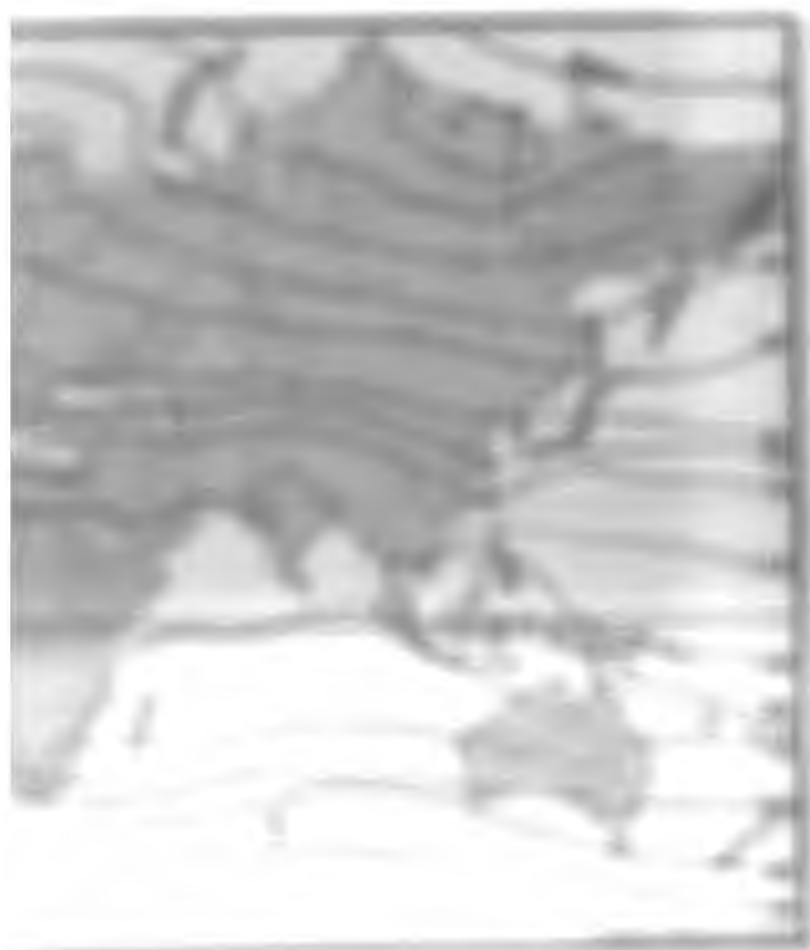
Seasonal Temperature Range. From the above it is seen that the range of temperature is not the same in all parts of the world. In the tropics the range is small, while in the temperate and arctic regions it is large. The range of temperature is also affected by the position of the land and sea, and by the direction of the winds.

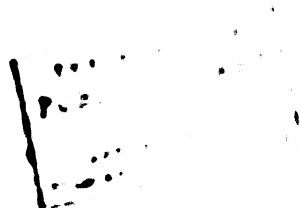
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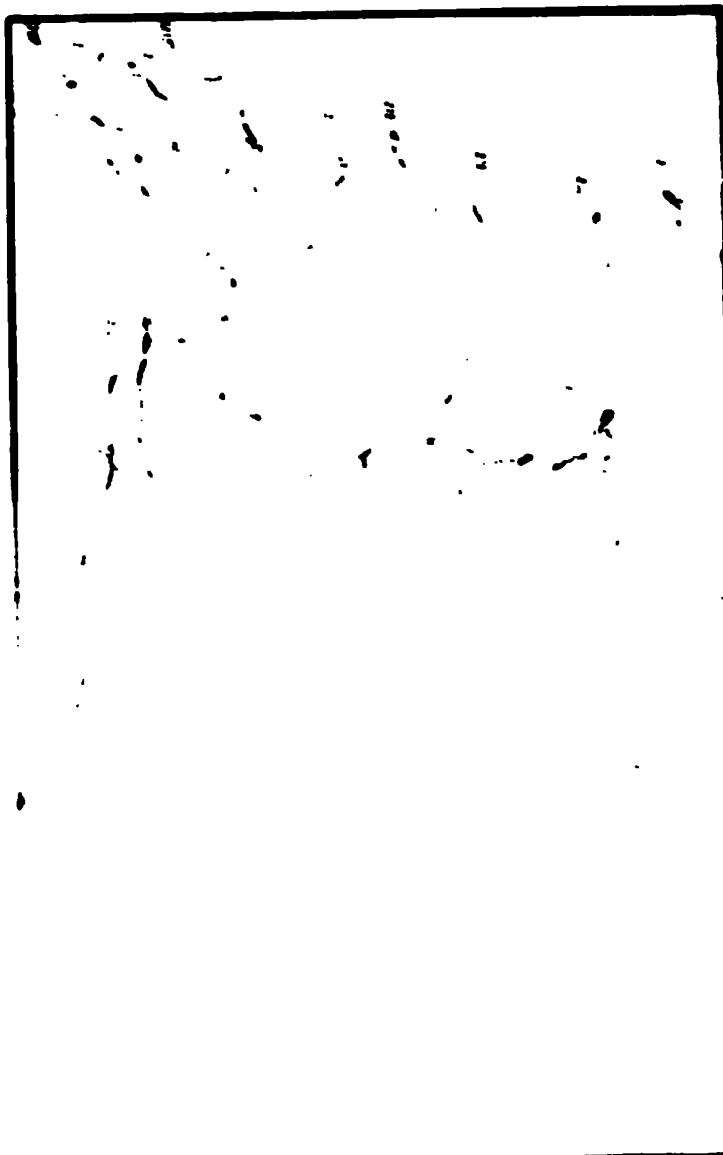
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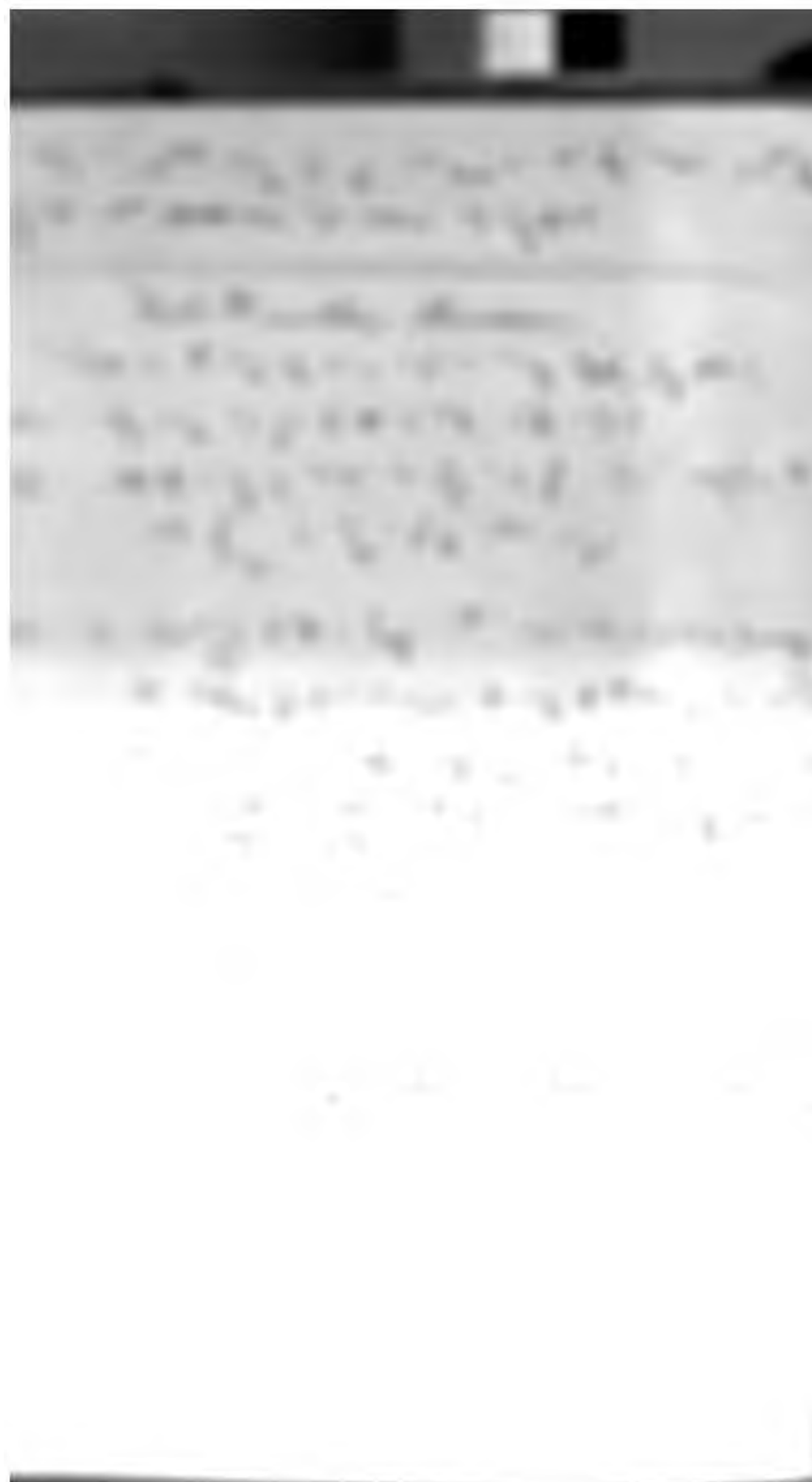
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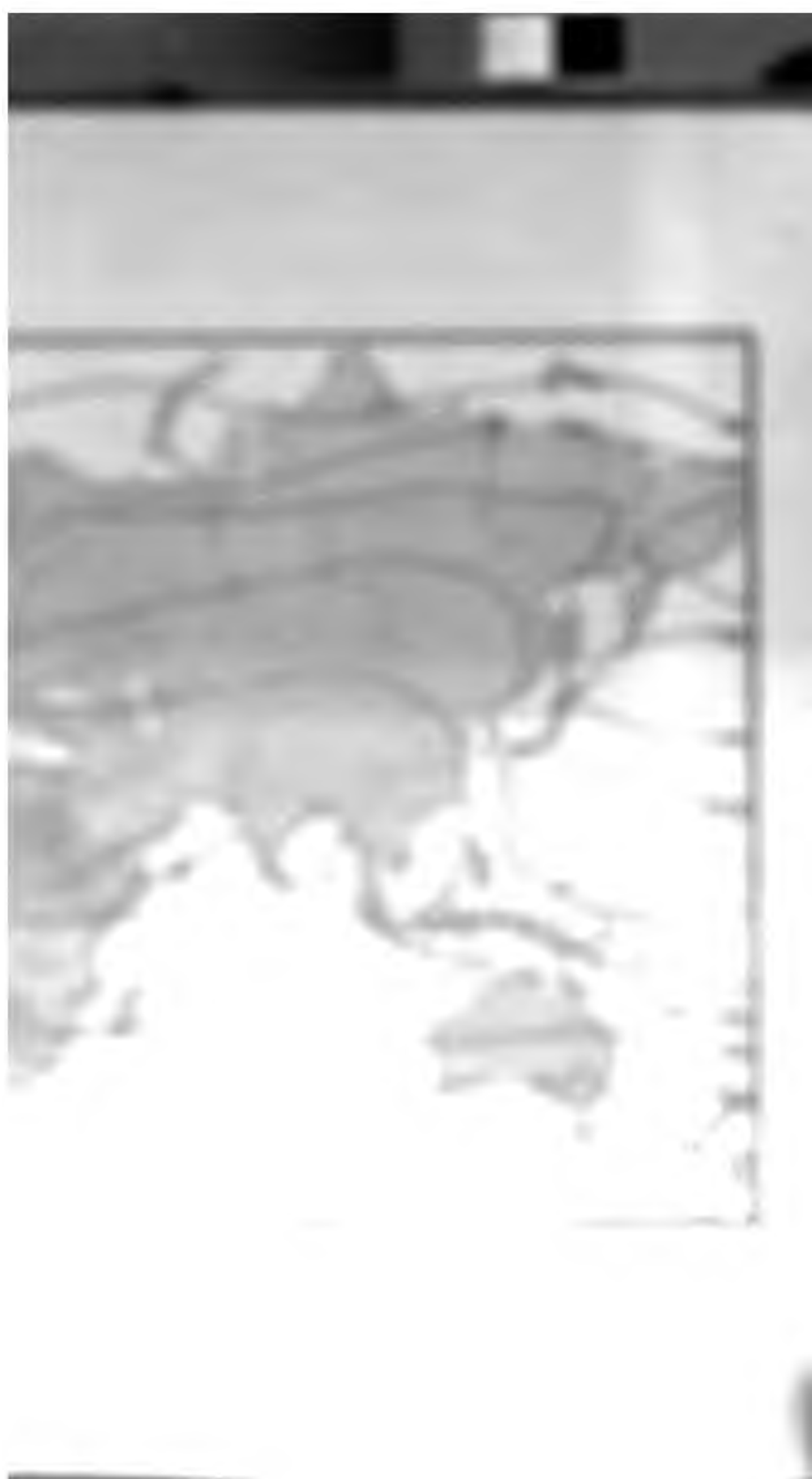




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I have a letter from the father of the deceased, Henry, dated 1890, in which he writes to me that he has been told that the deceased was a very good person and that he was a very good person. I have a letter from the father of the deceased, Henry, dated 1890, in which he writes to me that he has been told that the deceased was a very good person and that he was a very good person.



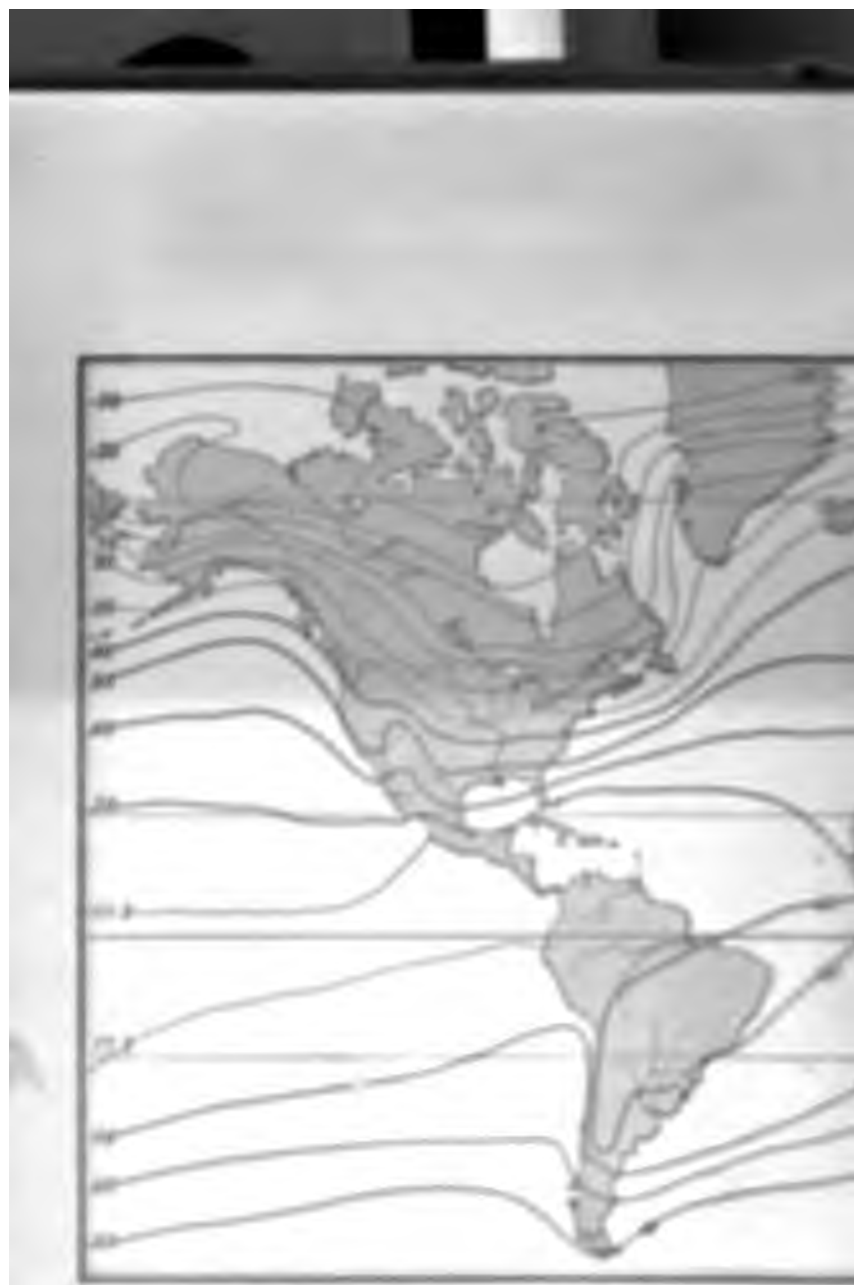


Figure 1

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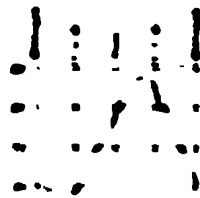
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Daily Temperature Curve. The daily curve represents the diurnal variation of temperature during the day and night. It is a curve which shows the temperature at different times of the day. The temperature is highest at noon and lowest at midnight. The curve is a smooth curve which shows the variation of temperature during the day and night.



The curve of highest temperature is when the sun is at its highest in the sky. The curve of lowest temperature is when the sun is at its lowest in the sky. The curve of highest temperature is when the sun is at its highest in the sky. The curve of lowest temperature is when the sun is at its lowest in the sky.

the victim's response to the victim's request to return to the victim's home (Fig. 2).

When the victim's response to the victim's request to return to the victim's home is positive, it is possible to see a positive response to the victim's request (Fig. 2). The victim's response to the victim's request is positive (Fig. 2).



Figure 2: Victim's response to the victim's request to return to the victim's home.

When the victim's response to the victim's request to return to the victim's home is positive, it is possible to see a positive response to the victim's request (Fig. 2). The victim's response to the victim's request is positive (Fig. 2).



Figure 3: Victim's response to the victim's request to return to the victim's home.



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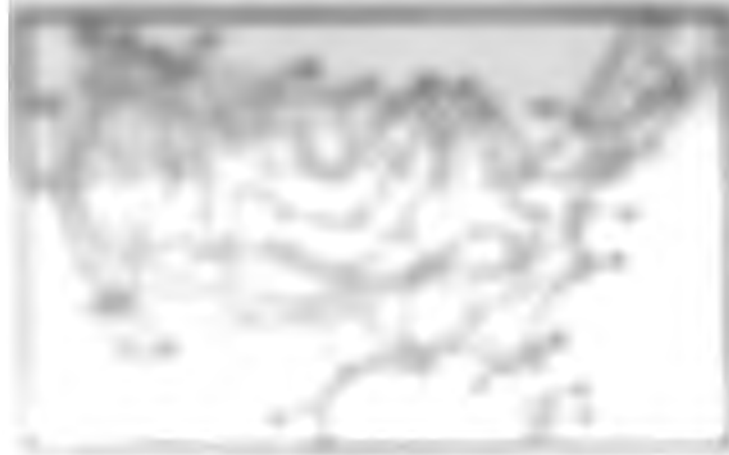
Temperature Gauge

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the first half of the century. In 1800, the population of the United States was about 4 million. By 1850, it had increased to about 23 million. This rapid increase in population was due to a number of factors, including the discovery of gold in California in 1848, the invention of the steam locomotive in 1825, and the discovery of oil in 1859. These factors, along with the discovery of the West, led to a rapid increase in the population of the United States.

The rapid increase in population led to a rapid increase in the demand for food and other goods. This led to the development of agriculture in the United States.

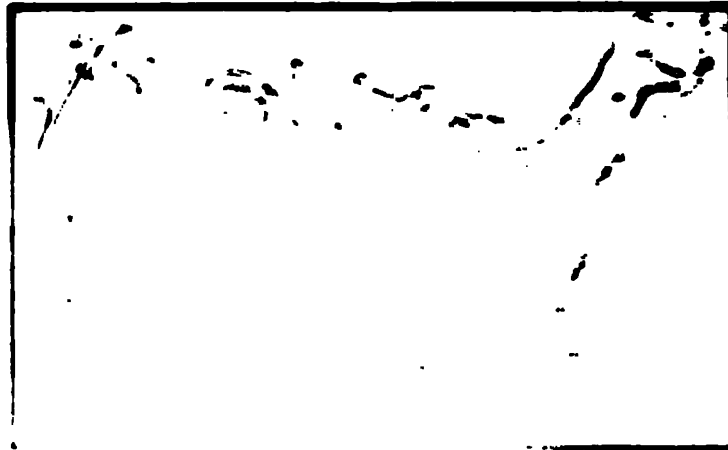


Map of the United States showing the locations of major agricultural products.

The map shows the distribution of various agricultural products across the United States. The regions are labeled with numbers 1 through 10, corresponding to the following areas: 1. Northeast, 2. Middle Atlantic, 3. South Atlantic, 4. Gulf of Mexico, 5. Southwest, 6. West, 7. Northwest, 8. Pacific Northwest, 9. Alaska, and 10. Hawaii.

observed at New West end in the month of September. In some of the more remote parts of the Florida the pressure difference is comparatively large, the rate of change being even 20 in 24. Moreover, the rate of change is not everywhere the same, being 100 in 24 in some places.

The above observations indicate that the rate of change is not everywhere the same, but is greater in some places than in others. This is due to the fact that the rate of change is greater in some places than in others.





66

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The contents of this letter are classified "CONFIDENTIAL" and are not to be released or discussed in any way without the express written approval of the Director of the Central Intelligence Agency. It is requested that you do not discuss the contents of this letter with anyone other than those to whom it is addressed. In the event you are requested to discuss the contents of this letter, you should refer to the Director of the Central Intelligence Agency for guidance. This letter is being furnished to you for your information and is not to be used for any other purpose. It is requested that you do not discuss the contents of this letter with anyone other than those to whom it is addressed. This letter is being furnished to you for your information and is not to be used for any other purpose. It is requested that you do not discuss the contents of this letter with anyone other than those to whom it is addressed.

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CHAPTER IV

GENERAL CIRCULATION OF THE ATMOSPHERE

General Statement.—When the air is very still, and condition easily changed by variations in temperature, it readily causes to move. No better illustration can be found of the mobility of the air under these circumstances, than that which is so often noticed on heated deserts. The ground becomes warmed, the air is heated by contact with it,

1. The purpose of this document is to provide information regarding the proposed changes to the existing regulations. The document is intended for the use of the public and the private sector.

2. The proposed changes are based on the findings of the study conducted by the Department of the Interior. The study found that the existing regulations are outdated and need to be revised.

3. The proposed changes will be implemented in a phased manner. The first phase will involve the revision of the existing regulations. The second phase will involve the implementation of the revised regulations.

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10. The proposed changes will be implemented in a phased manner. The first phase will involve the revision of the existing regulations. The second phase will involve the implementation of the revised regulations.

1. The first step in the process is to identify the problem or issue that needs to be addressed. This involves gathering information and understanding the context of the problem.

2. Once the problem is identified, the next step is to define the objectives and goals of the project. This helps to clarify what needs to be achieved and provides a clear direction for the team.

3. The third step is to develop a plan or strategy to address the problem. This involves breaking down the problem into smaller, manageable tasks and determining the resources needed to complete each task.

4. The fourth step is to implement the plan. This involves putting the strategy into action and monitoring progress regularly to ensure that the project is on track.

5. Finally, the fifth step is to evaluate the results of the project. This involves assessing the outcomes against the objectives and goals to determine the effectiveness of the project and identify areas for improvement.

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3. The third step is to develop a plan or strategy to address the problem. This involves breaking down the problem into smaller, manageable tasks and determining the resources needed to complete each task.

4. The fourth step is to implement the plan. This involves assigning tasks to team members, setting deadlines, and monitoring progress to ensure that the project is on track.

5. The final step is to evaluate the results of the project. This involves comparing the actual outcomes with the objectives and goals to determine the effectiveness of the project and identify areas for improvement.



denser, and hence the barometer registers a higher pressure of the air. Therefore the relation between air pressure and wind is very intimate; and where, for any reason, low-pressure areas exist, winds are found blowing toward them (Plate 9). This is the case in certain areas which are permanently warmer than the surrounding regions, and in those disturbances of the air which are classed as storms. A barometric gradient is produced, and the winds move as if they were going down grade. The air moves away from high and toward low pressure areas.

Classification of the Winds.—For the sake of simplicity the consideration of the movements of the atmosphere

is divided into two main branches, the *general circulation* and the *local circulation*. The *general circulation* is that which is caused by the unequal heating of the earth's surface, and the *local circulation* is that which is caused by local differences in the heating of the earth's surface.

General Circulation		Local Circulation	
The general circulation is that which is caused by the unequal heating of the earth's surface, and is the result of the differential expansion and contraction of the air.	The general circulation is the result of the differential expansion and contraction of the air, and is the cause of the trade winds, the monsoons, and the general circulation of the atmosphere.	The local circulation is that which is caused by local differences in the heating of the earth's surface, and is the result of the differential expansion and contraction of the air.	The local circulation is the result of the differential expansion and contraction of the air, and is the cause of the trade winds, the monsoons, and the general circulation of the atmosphere.
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Figure 1

Figure 2







TO
FROM
DATE

Journal of Management Education 37(1) 1-10
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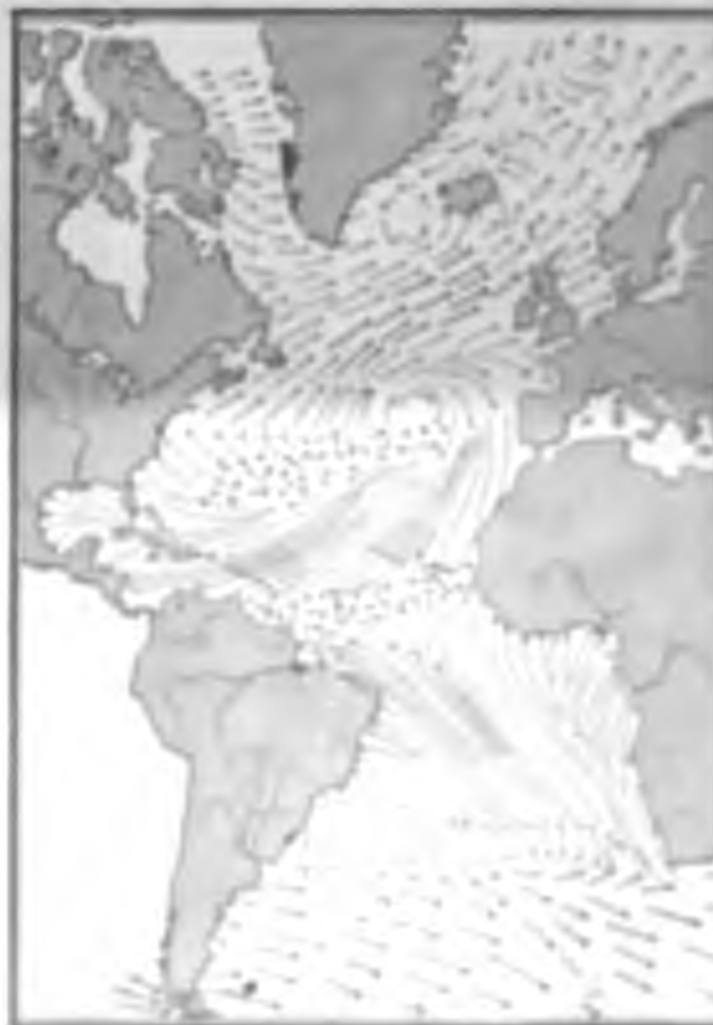


FIG. 1. Wind patterns in the Atlantic Ocean.

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Address: 1000 University Ave., Suite 100, Berkeley, CA 94702-1500
planetary circulation—Over the heat equator, the air in this geostrophic circulation rises by convection; and in this place

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THE HISTORY OF THE UNITED STATES 15

the United States. The year of 1776 was the year of the American Revolution.

The United States was a new country, a new nation, a new people. It was a land of freedom, a land of opportunity, a land of hope. It was a land where every man was free to follow his own path, to pursue his own dreams, to achieve his own goals. It was a land where every man was free to worship his own God, to practice his own religion, to live his own life. It was a land where every man was free to speak his own mind, to express his own opinions, to stand up for his own rights. It was a land where every man was free to be himself, to be true to himself, to be proud of himself. It was a land where every man was free to be a part of something greater than himself, to be a part of a great nation, to be a part of a great future.

The United States was a land of many peoples, many languages, many customs, many traditions. It was a land where every man was free to be who he was, to be what he was, to be where he was. It was a land where every man was free to be a part of something greater than himself, to be a part of a great nation, to be a part of a great future. It was a land where every man was free to be a part of something greater than himself, to be a part of a great nation, to be a part of a great future.

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PHYSICAL GEOGRAPHY.

at Cape of Good Hope, and return by way of the Cape of Storms. In the northern hemisphere, the most striking feature of the prevailing westerlies upon the surface, is the fact that they determine the path of movement of the greater number of our storms.

Periodical Winds. — There are certain changes of a periodical nature, which tend to start the air in motion in a definite way; and this tendency is repeated at those periods which are most important. The most important of these are those which are due to the variation in the solar energy in the different seasons, and in the day and night. The periodical winds may therefore be divided into seasonal and other winds; and to the group may also be included two or three

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tendency toward inflowing summer and outflowing winter winds is quite pronounced.

Even where the distinct monsoon condition is not shown, a tendency to the predomination of this class of winds often expresses itself in the disturbance of the wind direction. This is very well illustrated along the Texas coast where the summer trade winds are deflected northward upon the land. This phenomenon is shown on Figs.



10 and 11; and on the charts it will also be seen that in the winter, the prevailing winds of the coast of northern United States are from the land toward the ocean, while in summer their direction is more from the ocean. That is to say, the prevailing westerly winds are strengthened in winter and weakened in summer by the monsoon tendency, which is a

very important factor in the climate of the region. The same tendency is also shown in the wind patterns of the North Pacific, where the prevailing winds are from the southwest in the summer and from the northeast in the winter. This is also true of the North Indian Ocean, where the prevailing winds are from the southwest in the summer and from the northeast in the winter. The monsoon tendency is a very important factor in the climate of the region, and it is one of the most important factors in the climate of the world.

Modeling the Distribution of the Number of Children Born to Women. The number of children born to a woman is a variable of interest to many researchers. In this paper, we model the distribution of the number of children born to women in the United States. We use a generalized linear model with a log link function to model the distribution of the number of children born to women. We use data from the 1990 U.S. Census to estimate the parameters of the model. We find that the number of children born to women is positively correlated with the mother's education level and the mother's age at first birth. We also find that the number of children born to women is negatively correlated with the mother's race and the mother's marital status.

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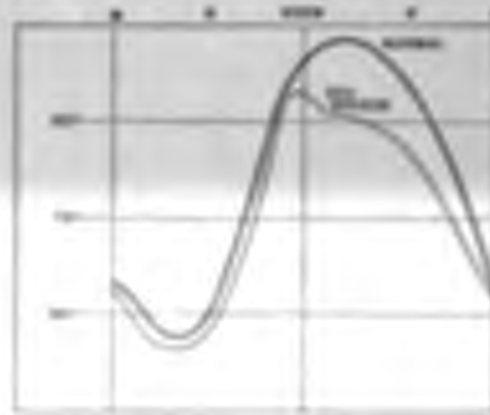
Modeling the Distribution of the Number of Children Born to Women. The number of children born to a woman is a variable of interest to many researchers. In this paper, we model the distribution of the number of children born to women in the United States. We use a generalized linear model with a log link function to model the distribution of the number of children born to women. We use data from the 1990 U.S. Census to estimate the parameters of the model. We find that the number of children born to women is positively correlated with the mother's education level and the mother's age at first birth. We also find that the number of children born to women is negatively correlated with the mother's race and the mother's marital status.



Figure 1

change in temperature there is produced a local circulation resembling in a small way the more extensive coastline or monsoon circulation which depends upon seasonal change in temperature.

When prevailing winds blow upon the coast, as is of the case in the trade wind belt, the intensity of these winds is sometimes considerably increased during the day, by



combination of sea breeze and normal winds. Even on the coast where no trade winds are present, the product of the sea breeze is present, change in temperature between day and night does not all

the same. The sea breeze is a local wind which is produced by the difference in temperature between the land and the sea. It is a wind which blows from the sea towards the land during the day, and from the land towards the sea during the night. It is a wind which is produced by the difference in temperature between the land and the sea.

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Cayuga. At night-time the air flows down these valleys, producing perceptible breezes. Concentrated in the large valley occupied by the lake, the wind often develops into a strong breeze during the calm summer nights; and the wind lasts until eight or nine o'clock in the morning. No breeze of the valley type has been noticed here. It is probable that in the other similar valleys of this region the same breeze is produced; and it may be expected in almost any place where the land is deeply cut by valleys.

Eclipse and Tidal Breezes.—These are practically unimportant. During total eclipses of the sun, breezes have been noticed whose origin seems to be due to this unusual solar eclipse with the sun's rays. When tides rise to a great

height, the breeze is called the *ebb breeze*, and is accompanied by a strong wind from the sea, which is called the *ebb wind*. The breeze is called the *ebb breeze* because it is accompanied by a strong wind from the sea, which is called the *ebb wind*.

Longer Wards.—The wind is called the *ebb breeze* because it is accompanied by a strong wind from the sea, which is called the *ebb wind*. The breeze is called the *ebb breeze* because it is accompanied by a strong wind from the sea, which is called the *ebb wind*. The breeze is called the *ebb breeze* because it is accompanied by a strong wind from the sea, which is called the *ebb wind*.

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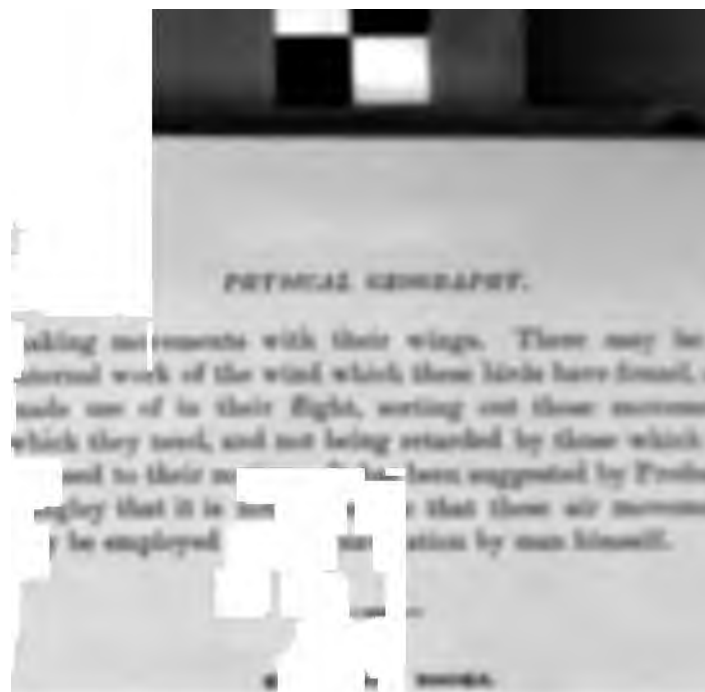
It is the duty of the physician to see that his patient is not only cured but that he is also made a better person. The physician should not only cure the patient but should also make him a better person.

The physician should not only cure the patient but should also make him a better person. The physician should not only cure the patient but should also make him a better person. The physician should not only cure the patient but should also make him a better person.

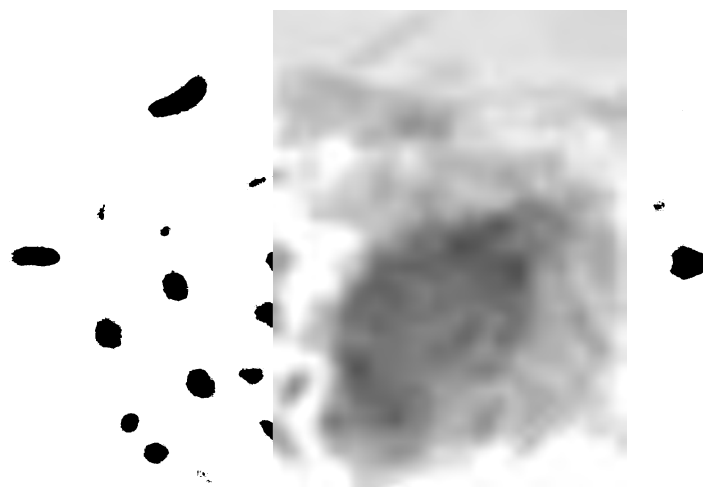
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1936



Physical Geography. The study of the physical features of the earth, such as mountains, rivers, and the climate. It is a branch of geography that deals with the natural environment and how it affects human life. The study of physical geography is important because it helps us understand the world around us and how it has changed over time. It also helps us to predict future changes and to make decisions about how to live in a sustainable way.



from the rising of the air, and the consequent cooling, the dew-point is reached. In the same way, air that rises as a result of convection may reach the dew-point, thus forming clouds and rain. These kinds of rainstorms are not particularly important in northern United States, and the two need not be considered in detail.

These storms aid in the formation of the very important group of storms which bring the greater part of the rain that falls in the northern half of this country. To these same cyclonic storms may be given, and these are not

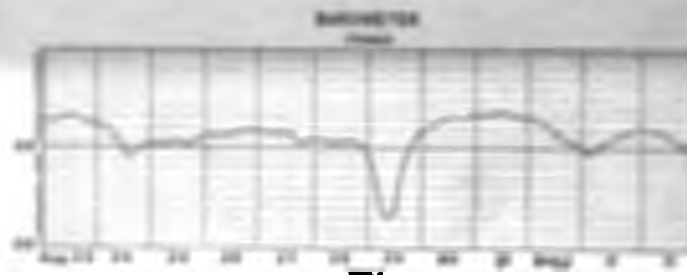


FIG. 11.

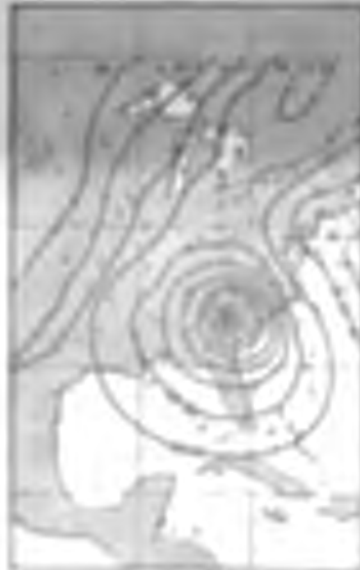
FIG. 11. The surface of a mountain, showing the variation of the surface of a mountain.

the same kind of storms, but they are of a different kind. These storms, however, are of a different kind, and they are of a different kind. They are of a different kind, and they are of a different kind. They are of a different kind, and they are of a different kind.

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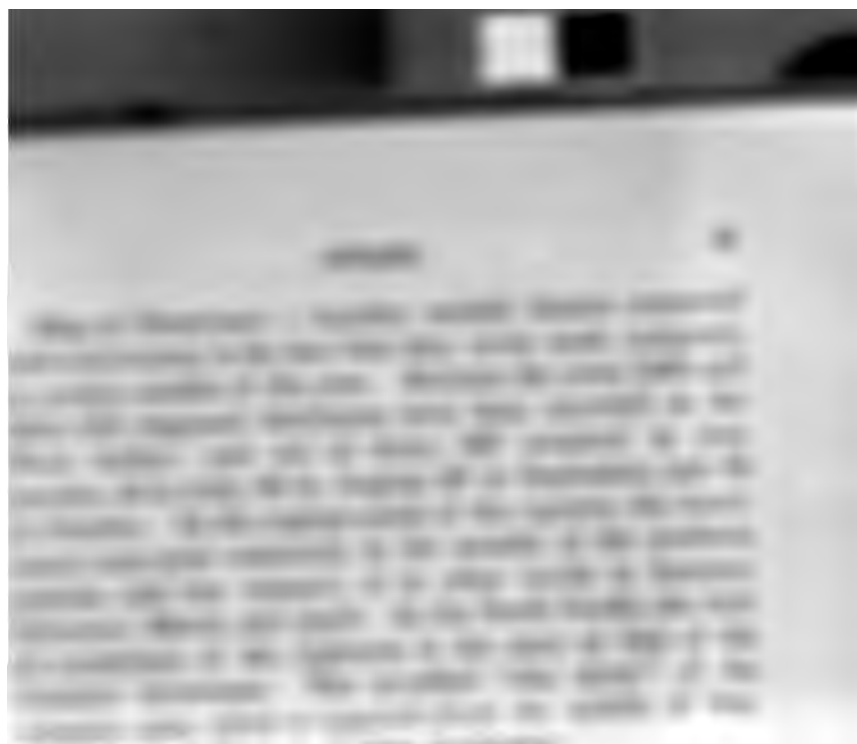
whirling air, toward the center of which the winds are blowing from all directions, along spiral courses, as is shown in the accompanying diagrams (Figs. 41, 42, and 43). The hurricane is therefore not unlike the desert dust whirl which was described in the last chapter. Air is moving toward a central axis, where it ascends and flows away in the air above. This outflowing of the air in the upper parts of the storm, is shown to exist by the movements of the upper clouds, which spread outward as long streamers.



Effects.—The violence of the winds in a hurricane are almost incredible, and many a ship that has been driven into the dangerous whirl has not been able to escape destruction. The tendency is for a vessel to be whirled around the storm center, and if it happens to pass through the center or "eye of the storm," the sudden change

22, 1874, 100,000 people were killed. Even along the Atlantic coast of the United States, where the hurricanes are of much less violence than in the tropics, a vast amount of destruction is done by them. Not only are ships destroyed, but the low coasts are swept by storm waves (Fig. 22), as has frequently been the case on the New Jersey coast and on the Sea Islands of the Carolina coast.

Path.—In the North Atlantic, the hurricanes usually move first toward the northwest, then they curve and pass along the Atlantic coast of the United States until the latitude of Cape Hatteras is reached, when they generally turn to the right and pass in a southeasterly direction out into the Atlantic, which they often cross (Fig. 41). However, a



PHYSICAL GEOGRAPHY.

ing here, air is blowing toward the place of ascent. As a result of the directly influencing air, a whistling can be produced; and some cause must be found which originates the spiral motion of the air. A possible cause for this is the deflective influence of the earth's rotation, but ordinarily this can produce little effect near the equator, because the difference in the velocity of rotation at great latitudes in this belt is very slight (Fig. 1). On examining the temperature charts of the sea, we find that the heat equator is farthest from the geographic equator in the late summer and early autumn, that it migrates farthest from the equator in the north hemisphere, while in the Atlantic it is never far south of

[illegible]



the weather changes of the northern temperate latitudes. The "northeast storms" of New England, so called because they bear damp northeast winds, belong to this class. Every part of the east experiences them, and their importance is very great.

So close is the resemblance between hurricanes and temperate latitude cyclones, that when the latter are violent, it



FIG. 41.

Map showing the general character of the storms which affect the North Atlantic.

is not surprising that the same principles apply to both. The only difference is that the storms of the temperate latitudes are generally less violent than those of the tropics. The same principles apply to the storms of the North Pacific, which are also generally less violent than those of the tropics. The same principles apply to the storms of the North Indian Ocean, which are also generally less violent than those of the tropics. The same principles apply to the storms of the North Arctic Ocean, which are also generally less violent than those of the tropics.



PHYSICAL GEOGRAPHY.

they are formed, while the temperate latitude cyclones all develop violence as they proceed on their course. While cyclones may at times become very violent, they never attain the intensity which is noticed in some hurricanes. The whirl of the air in the temperate latitude cyclones is not so direct as in the hurricanes (Figs. 44 and 45), and, in the former, there is rarely if ever a distinct "eye."

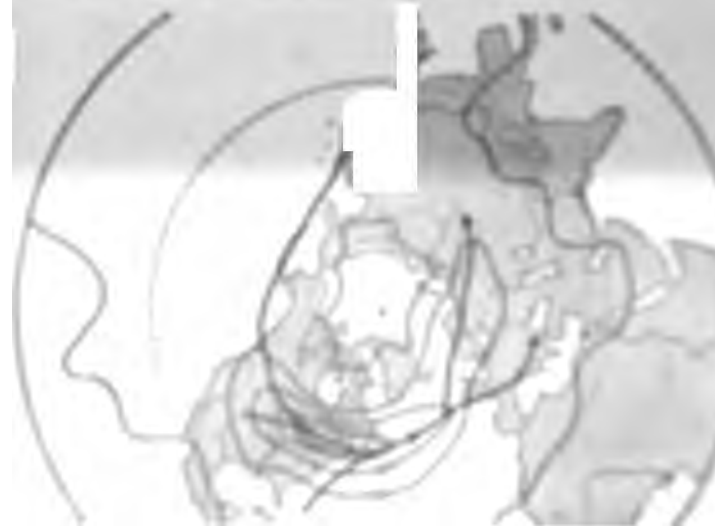


Fig. 44.

Diagram illustrating the structure of a cyclone system, showing the path of the storm and the distribution of wind speeds.

The diagram shows a cross-section of the atmosphere over the ocean. The wind speed is indicated by the length of the arrows. The arrows are longest in the outer zone and shortest in the inner zone. The central area is labeled 'EYE'. The diagram illustrates the typical structure and path of a temperate latitude cyclone.



and pass across the United States, the Atlantic, and Europe, thus going nearly around the north (Fig. 48). While path of progression is usually regular, there are many irregularities of a parallel and rather exceptional sort (Fig. 49). The origin of these is not well understood.

Effects. — The effects of these storms in northern United States are very important; and they are not confined to this region, but occur in Asia, Europe, and the north temperate latitudes. In the United States, the storms usually come from the west, and hence from the interior, while in Asia they come from the ocean. They bring to us the greater part of our rain and snow; they are the main cause of our hurricanes and tornadoes; they produce many of

Introducing the idea of change into a complex model is a difficult task. In many cases, the model is already complex and the addition of change is a significant challenge. The model is a complex system and the addition of change is a significant challenge. The model is a complex system and the addition of change is a significant challenge.

PUTTING IT TOGETHER

unreasonable rise in the temperature, and move
 away before it with great rapidity.

On the western or rear side of cyclones, instead of warm
 there are cold winds. Here the air comes from cold north-
 ern lands, and in a measure also from the upper layers of the
 air. When very cold and dry, it is called a north or northwest wind.
 It is known as blizzard when it comes with snow. It often
 brings with it squalls of snow. The name of the blizzard is the
 same as the name of the storm region of central Europe,
 but milder form, often snowless. In Europe, the name
 of wind is developed from the name of the storm. In Texas the north is a
 wind of similar origin.

[illegible]

1. The first step is to identify the problem. In this case, the problem is that the company is not meeting its sales targets.

2. The second step is to analyze the data. This involves looking at the sales figures for each product line and identifying any trends or patterns.

3. The third step is to develop a plan. This involves setting specific goals for each product line and determining the actions that need to be taken to achieve those goals.

4. The fourth step is to implement the plan. This involves putting the plan into action and monitoring the results.

5. The fifth step is to evaluate the results. This involves comparing the actual results to the targets and determining whether the plan was successful.

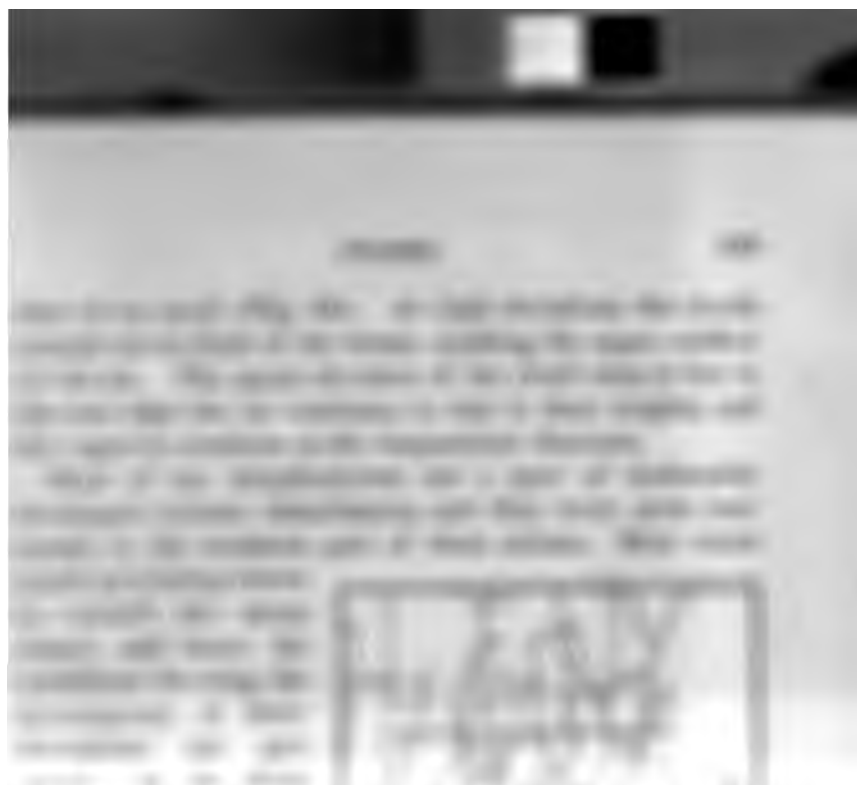
Figure 1. The effect of the concentration of the *Agrobacterium* suspension on the transformation efficiency of *Agrobacterium* strains. The *Agrobacterium* strains were cultured in the YEA medium for 24 h and then adjusted to the concentration of 1×10^8 cells/ml. The *Agrobacterium* strains were then cultured in the YEA medium with the concentration of 100, 200, 300, 400, 500, 600, 700, 800, 900, and 1000 cells/ml. The transformation efficiency was determined by the number of transformants per 100 cells. The results are shown in Table 1.

convection, if the ascent carries the air high enough for the dew-point to be reached, clouds may form and rain fall. In such cases electricity may be generated, and lightning and thunder may accompany the rain. In the belt of subtropics, the ascent of the moist air causes frequent thunderstorms during the day; and in summer, the rising air among the mountains may cause the formation of thunderclouds and rain. In this class of storm there is no distinct whirl, but a simple ascent of moist air.

In central and eastern United States, thunderstorms are



common in summer; and they also are the result of uprising moist air. That this is so, is shown by the fact that they occur almost exclusively in summer, and near the close of hot, sul-



are generally not violent; but there is a steady and often heavy downfall of rain, with accompanying thunder and lightning. In some cases the downpour of rain is excessive; and among the mountains of the west, there are often such torrents of water that the name *avalanche* is given to them. The name is certainly warranted, for the water falls in sheets, in a manner which can be appreciated only after having seen one. These excessive rains may be due to a super-saturation of the air.

Furrows and Waterspouts.—These extraordinarily violent storms are fortunately small, local, and not common in most of the country. Like the dust whirl of the desert, or like the hurricane, they are whirling bodies of air, in which

the wind is very violent, and the rain is very heavy. (Fig. 12.)

The waterspout is a small, but very violent storm, which is seen



in the open sea, and the water is very

violent. (Fig. 13.) It is an

extraordinary phenomenon, and is

very rare. It is seen in the

open sea, and is very violent.

It is a very rare phenomenon, and

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open sea, and is very violent.

It is a very rare phenomenon, and

is very violent. It is seen in the

storm center, while above it there is a colder layer of colder moving air. Therefore the conditions of the atmosphere are peculiarly unstable; and the increased heat caused by sun, starts an overturning which soon takes the form of violent whirl. This is not possible in the far west, where the lower air is cold and in the east, the atmosphere is much more sufficiently warm state for this violent overturning.



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THE JOURNAL OF THE
ROYAL ANTHROPOLOGICAL INSTITUTE

result of the stirring of the air, and the inflow of new supplies of air, wind tends to check dew formation. Because the air is more humid, dew is formed more readily near streams or swamps than in dry places. There is heavier in valleys than on hills, partly because of the greater dampness of the valleys, partly because cold air slides down into them from the hillsides, and partly because the air in valleys is more quiet than that on the hilltops.

While the main cause for dew seems to be condensation of vapor from the air, recent studies show that this is not the only cause. At all times plants are furnishing moisture to the air by transpiration. Ordinarily this is evaporated, but at night this evaporation is checked, when the air is

The following is a summary of the results of the study. The first group of patients, who were treated with the standard dose of 10 mg. of the drug, showed a marked improvement in their condition. The second group, who were treated with a higher dose of 20 mg., showed a more rapid and complete recovery. The third group, who were treated with a still higher dose of 30 mg., showed a complete recovery in a shorter period of time. The results of this study indicate that the higher doses of the drug are more effective than the standard dose. It is suggested that the dose of the drug be increased to 20 mg. or 30 mg. in cases where the standard dose fails to produce a satisfactory result.

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various temperatures often causes cloud formation, and this appears to be the origin of many of the clouds of the upper atmosphere. In reality, fog is a form of clouds, and



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cloud of ice. When best developed, as is the case in winter they are the typical thunder heads, which rise from a base, at an elevation of about a mile, and extend into the sky to a height of several thousand feet above it. They consist of a mass of rounded, dome-like clouds, which often produce a very fantastic and beautiful effect, particularly when lighted by the rays of the setting sun.

These clouds are common, every-day occurrences in both of values, and in summer they are often produced around mountain peaks, and over the heated lowlands; in these cases their cause is the ascension of warm moist air, and during hot summer days they may often be seen from the land, they are much more readily seen

from the water, and the formation of clouds is effected in a very different manner. When the air is warm and moist, it rises, and as it rises it expands, and the expansion causes it to cool, and the cooling causes the moisture in the air to condense, and the condensation produces the clouds.

The clouds are produced in a very different manner from those which are produced over the land, and the clouds which are produced over the water are much more numerous and more varied in form than those which are produced over the land.

The clouds which are produced over the water are much more numerous and more varied in form than those which are produced over the land, and the clouds which are produced over the water are much more numerous and more varied in form than those which are produced over the land.

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The clouds which are produced over the water are much more numerous and more varied in form than those which are produced over the land, and the clouds which are produced over the water are much more numerous and more varied in form than those which are produced over the land.

The following table shows the results of a series of experiments conducted in the laboratory of the American Medical Association, which have been published in the *Journal of the American Medical Association*, Vol. 51, No. 1, p. 1, 1938.

These experiments were conducted under the supervision of the American Medical Association, and the results are published in the *Journal of the American Medical Association*, Vol. 51, No. 1, p. 1, 1938. The experiments were conducted in the laboratory of the American Medical Association, and the results are published in the *Journal of the American Medical Association*, Vol. 51, No. 1, p. 1, 1938.

TABLE I
RESULTS OF EXPERIMENTS
CONDUCTED IN THE
LABORATORY OF THE
AMERICAN MEDICAL
ASSOCIATION, 1938



FIG. 1. Results of experiments.

The results of the experiments conducted in the laboratory of the American Medical Association, 1938, are shown in the figure. The results are published in the *Journal of the American Medical Association*, Vol. 51, No. 1, p. 1, 1938.

The results of the experiments conducted in the laboratory of the American Medical Association, 1938, are shown in the figure. The results are published in the *Journal of the American Medical Association*, Vol. 51, No. 1, p. 1, 1938.

while in the other case a cold covering of solid snow is laid upon the land, perhaps to stay for months. The clouds in the upper air are mostly made of ice or snow, and numerous peaks that extend into these upper layers, rarely receive any other form of precipitation.

Hail.—At times, particularly in summer, balls of ice known as hailstones fall from the clouds, especially in









Language in Motion in the World is a collection of essays, written by scholars from various disciplines, that explore the ways in which language is used to create and maintain social identity. The essays are organized into three sections: "Language and the Body," "Language and the Mind," and "Language and the World." The first section, "Language and the Body," includes essays on the relationship between language and the body, the role of the body in language use, and the ways in which language is used to create and maintain social identity. The second section, "Language and the Mind," includes essays on the relationship between language and the mind, the role of the mind in language use, and the ways in which language is used to create and maintain social identity. The third section, "Language and the World," includes essays on the relationship between language and the world, the role of the world in language use, and the ways in which language is used to create and maintain social identity.

PHYSICAL GEOGRAPHY.

With the seasonal change in the wind direction, we must have a dry and a wet season. In the interior continents, a condition of relative dryness usually prevails. It is not always a true desert condition, but often one of semi-aridity, in which the rainfall is not sufficient for successful agriculture. There may be every gradation between the humid country and a desert, passing through all stages of semi-aridity and the climate in which drought is common.

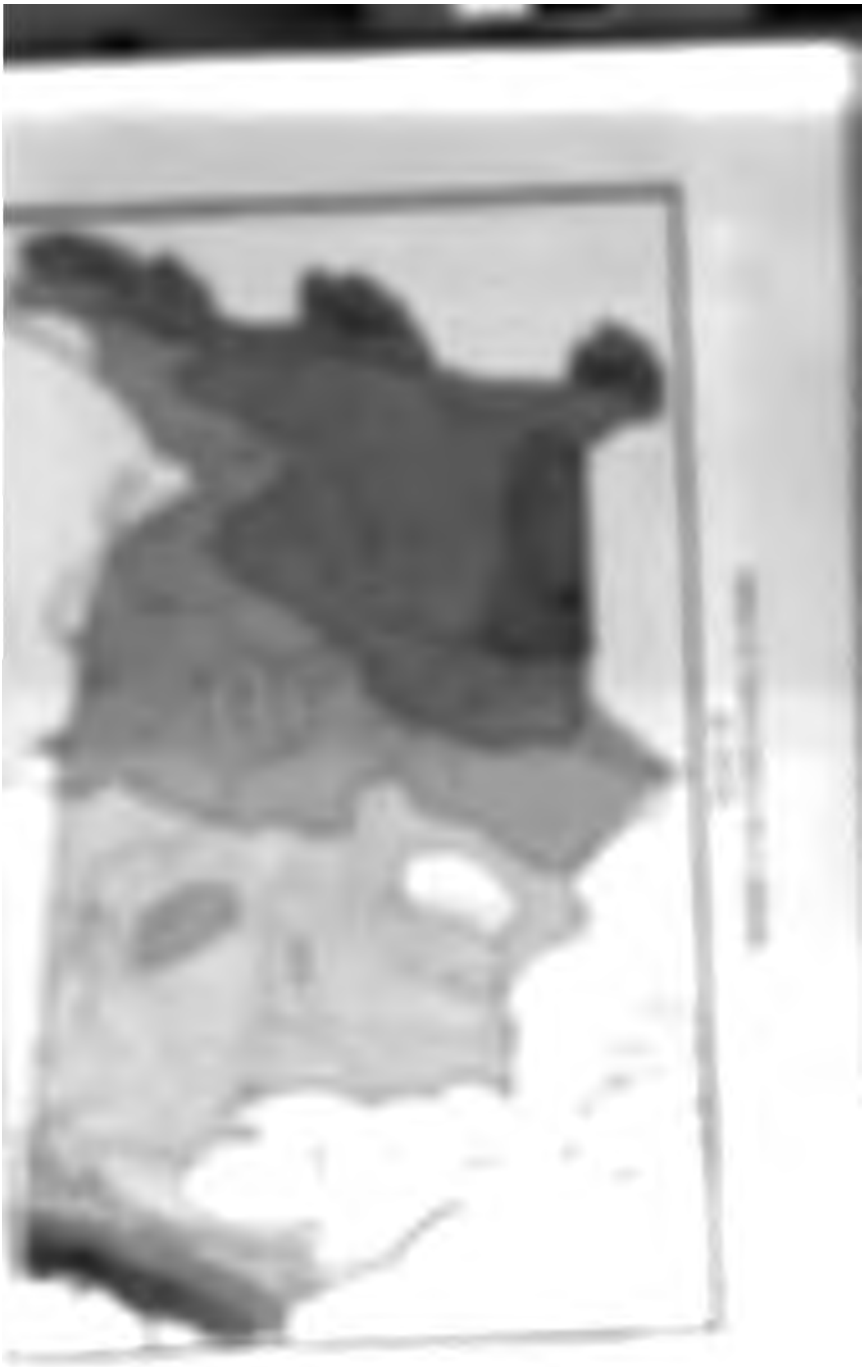
The greatest irregularities of rainfall are noticed in temperate latitudes; and are dependent in part upon the winds, the topography, the neighborhood to the sea, and the occurrence of cyclonic storms. In parts of the sea

the rainfall is very irregular, and is sometimes very heavy. In some parts it is very light, and in some it is very heavy. The rainfall is very irregular, and is sometimes very heavy. In some parts it is very light, and in some it is very heavy.

Characteristics of Rainfall in the Coastal Region.

The rainfall in the coastal region is very irregular, and is sometimes very heavy. In some parts it is very light, and in some it is very heavy. The rainfall is very irregular, and is sometimes very heavy. In some parts it is very light, and in some it is very heavy.

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arid. This is due to the fact that in the northern part, winds blow from the ocean against the mountains.

Because of this, the rainfall also decreases very rapidly from the immediate coast toward the interior. Beyond the mountains of the coast, the country is either arid or in truly desert condition; and this extends even to the plain states east of the Rocky Mountains. Throughout the great

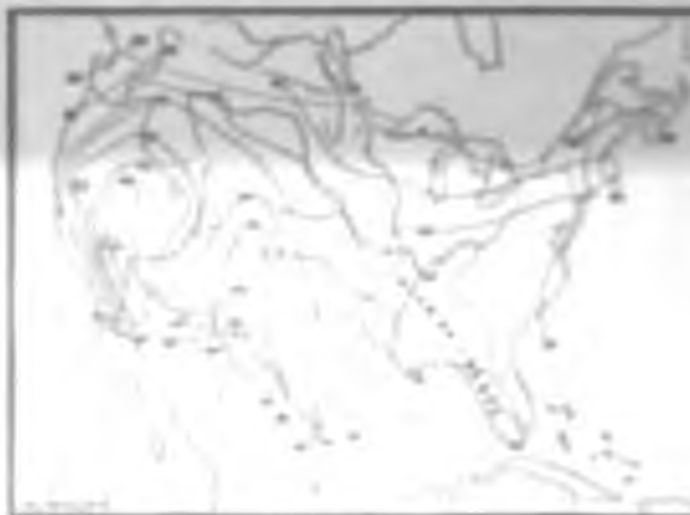


Fig. 1. The Pacific coast of the United States, showing the mountainous region and the arid interior.

interior of the United States, the rainfall is very small. The average annual rainfall in the interior is less than one inch. This is due to the fact that the mountains of the coast act as a barrier to the winds from the ocean. The winds from the ocean are forced to rise and cool, and the moisture is precipitated as rain on the coast. The interior, being far from the coast, receives very little rain.

REMARKS BY THE PRESIDENT.—The following remarks were made by the President of the Association at the opening of the annual meeting, held at the Hotel New Yorker, New York City, on November 1, 1933.



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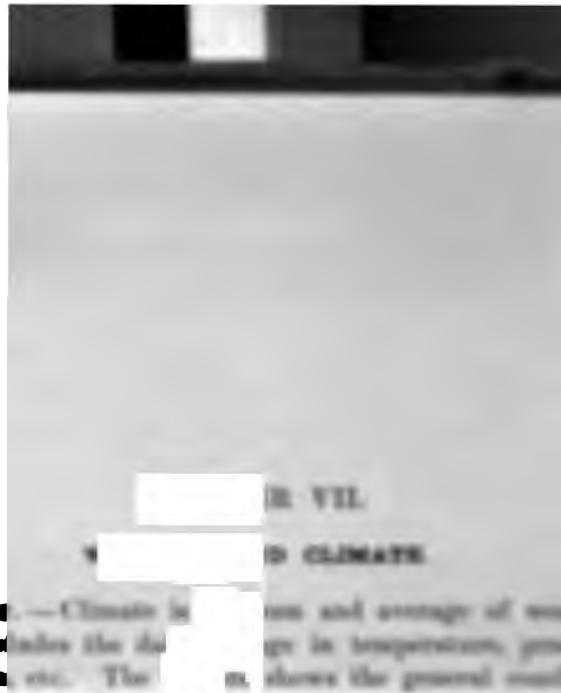


FIG. 11.
General features of monthly or seasonal variation of the wind in India.

produce glaciers as a result of accumulation of many winters' fall. The same is true in part the Arctic and Antarctic lands in these cold places, even the precipitation is mostly in the form of snow.

Seasonal Distribution of Rain — Many parts of the earth have wet seasons; and as has already been explained, this is usually due to a change in wind. In equatorial Africa, among the lowlands of the Nile, the migration of the belt of rain causes such a condition, the same is true of the Amazon Valley and the regions of the Congo. The blowing of the monsoon, the wind of Asia, and other causes very rainy conditions in some parts of the world. In the tropics, where the rainfall is very high, the amount of rain in the winter is only 10.2 inches, while in July it is more than 100 inches. The monsoon rainfall, which is greatest on the earth, is caused by the blowing of the monsoon over the tropical regions. In the eastern coast of the United States, particularly in Washington and Chicago, the winter rainfall

The first of these is the fact that the United States is a young nation. It is only about 150 years old, and its history is still in the making. The second is the fact that the United States is a large nation. It covers a vast area of land, and its population is growing rapidly. The third is the fact that the United States is a diverse nation. It is made up of many different peoples, each with its own customs and traditions. The fourth is the fact that the United States is a free nation. Its people enjoy the rights of free speech, free press, and free assembly. The fifth is the fact that the United States is a powerful nation. It has a strong military and a large economy. The sixth is the fact that the United States is a peaceful nation. It has never been at war with another country. The seventh is the fact that the United States is a democratic nation. Its people elect their representatives to the government. The eighth is the fact that the United States is a progressive nation. It is always looking for ways to improve itself. The ninth is the fact that the United States is a generous nation. It helps other countries in need. The tenth is the fact that the United States is a hopeful nation. It believes in a better future for itself and for the world.



Weather.—Climate is the mean and average of weather which includes the daily change in temperature, pressure, etc. The weather shows the general condition of the atmosphere at any given time.

Weather is the condition of the atmosphere at any given time and place. It is the result of the action of the sun, the earth, and the atmosphere. The weather is the result of the action of the sun, the earth, and the atmosphere. The weather is the result of the action of the sun, the earth, and the atmosphere.

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which radiation proceeds with ease, giving us our mild winter weather; but the cold is not so intense as in the interior area of the northwest.

In the summer, storms are less frequent and less violent but still they produce an effect upon the weather. If they are not intense, the warm air drawn in from the sea produces days of excessive heat and sultriness, during which thunderstorms may come; or a continuation of this condition may cause summer droughts. Along the seacoast, we are sometimes blown in upon the land, or the cool sea breeze may temper the heat of the summer day (Fig. 20). Well-developed cyclonic storms may arise; and in the case



FIG. 18.

FIG. 18. The effect of the sea breeze upon the weather of the coast.

FIG. 19. The effect of the sea breeze upon the weather of the coast. The sea breeze is shown as a line of air flowing from the sea to the land, and the land breeze as a line of air flowing from the land to the sea.

FIG. 20. The effect of the sea breeze upon the weather of the coast. The sea breeze is shown as a line of air flowing from the sea to the land, and the land breeze as a line of air flowing from the land to the sea. The sea breeze is shown as a line of air flowing from the sea to the land, and the land breeze as a line of air flowing from the land to the sea.

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ment, and each zone must be subdivided into oceanic, lake, interior, and upland climate.

Tropical Climate.—Between the tropics, the climate is warm and coasts are mostly warm and equable. The rainfall is considerable, though to this there are some exceptions, as for instance on those coasts from which a trade wind blows toward the sea. The delirious belt is a of excessive rain and very uniform conditions of temperature; but that of the trade winds has a more varied climate. In the interior of the continent, there is no variation, though the uniform condition is that of high temperature. The temperature ranges are greater than on coasts, and the average temperature is also higher.

the great interior region of extreme cold, north of the Great Lakes, emerging across the Labrador peninsula to the Atlantic, in the middle of which the climate is modified by the warm Gulf Stream.

Arctic Climate.—The arctic climate is one of constant and prolonged cold, and the ground is covered with snow for the greater part of the year. During the winter, the sun remains below the horizon, and in summer it does not set. On high mountains which rise into the cold layers of the upper air, many of the conditions of the arctic climate extend into the temperate, and even into the tropical zone (Fig. 64). Between the tropics, a temperate climate is found at moderate elevations on the mountain sides.

1. The first step in the process is to identify the problem. This involves gathering information about the situation and understanding the needs of the stakeholders involved. Once the problem is identified, the next step is to develop a plan of action. This plan should outline the goals of the project, the tasks that need to be completed, and the resources that will be required. Once the plan is developed, the next step is to implement the plan. This involves assigning tasks to team members, monitoring progress, and making adjustments as needed. Finally, the last step in the process is to evaluate the results of the project. This involves comparing the actual results to the goals and determining whether the project was successful.

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POTENTIAL GEOGRAPHY.

Climate varies so remarkably with differences in elevation of land, or in the relation between land and sea, that it is possible that changes of a purely geographic nature account for some of the variations. If large areas of land should be raised to greater elevations, or considerably lowered, or if the ocean currents should have their direction decidedly changed, the climate of parts of the world would be very different from the present. Such changes are not now occurring, and in this way some of the climatic variations can be explained; but at present, only hypothesis is used to account for the change.

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together; but the ocean is so different that it must be considered separately. The mobility of the water, and the moderate temperature ranges over the greater part of the ocean, are both favorable to the widespread distribution of marine life; and thus in great oceans we find some species ranging almost from one end to the other. The limit of temperature is the main check to the spread of many animals, and this is well illustrated by the distribution of *red-bellied coquina*, which are practically excluded from oceans where the water temperature downwards below 60°. Because the temperature of the ocean water downwards as the depth increases, the forms of life change with the depth.

In the case of women plants, we indeed found that levels were



variety and abundance; for while there are many vicissitudes in the colder zones, everything favours the development of life near the tropics. The animals of the Arctic must prepare themselves for the long, cold winter, and at all times the conditions surrounding them are severe. Only a few forms of mammals exist there, and these are very hardy and well pro-



Fig. 10.

vided with thick fur. The birds are also hardy and well adapted to the cold. The insects are few and far between, and the plants are mostly low and hardy. The vegetation is very sparse, and the soil is poor. The climate is very cold, and the weather is often very stormy. The animals are all well adapted to the cold, and the plants are all hardy and well adapted to the cold. The insects are few and far between, and the plants are mostly low and hardy. The vegetation is very sparse, and the soil is poor. The climate is very cold, and the weather is often very stormy.



climatic change from the rigorous winter to the warm summer.

The influence of temperature upon the abundance and kind of life, is also illustrated in the ascent of mountains (Fig. 90). Within the tropics, one may pass upward in places where plants exist, which in many respects resemble those of the temperate zone; and in this zone a few arctic habits exist upon many of the highest mountains. In studying the distribution of animals and plants, altitude is found to be a very important factor; and as one ascends a mountain, one



may find that the plants and animals are disappearing one by one, and that the

climate is becoming more and more rigorous. The same is true of the distribution of animals and plants in the tropics, where one may find that the same species are found at different altitudes.

The same is true of the distribution of animals and plants in the temperate zone, where one may find that the same species are found at different altitudes.

The same is true of the distribution of animals and plants in the arctic zone, where one may find that the same species are found at different altitudes.

The same is true of the distribution of animals and plants in the antarctic zone, where one may find that the same species are found at different altitudes.

The same is true of the distribution of animals and plants in the equatorial zone, where one may find that the same species are found at different altitudes.

The discovery of the bones has shown the extent of the human race in the past, and the discovery of the bones of the human race in the past has shown the extent of the human race in the past. The discovery of the bones has shown the extent of the human race in the past, and the discovery of the bones of the human race in the past has shown the extent of the human race in the past.



Fig. 10.
The human race in the past.

The discovery of the bones has shown the extent of the human race in the past, and the discovery of the bones of the human race in the past has shown the extent of the human race in the past. The discovery of the bones has shown the extent of the human race in the past, and the discovery of the bones of the human race in the past has shown the extent of the human race in the past.

the seeds. Therefore in the study of geographic distribution of plants, the seeds are of much interest. Some are heavy, and these drop to the ground close by the tree; but in some cases, these heavy seeds are enveloped in a fruit, which is eaten together with the seed; and since the germ is often protected by an indigestible shell, the vital part of these seeds may be carried for long distances, and then be left upon the ground unharned. Some seeds cling to the



FIG. 1. A. L. S. 1900.

the seeds. Therefore in the study of geographic distribution of plants, the seeds are of much interest. Some are heavy, and these drop to the ground close by the tree; but in some cases, these heavy seeds are enveloped in a fruit, which is eaten together with the seed; and since the germ is often protected by an indigestible shell, the vital part of these seeds may be carried for long distances, and then be left upon the ground unharned. Some seeds cling to the



male of Europe are quite different from those of America of South America from Africa.¹ Yet there is remarkable uniformity in the fact that the same large groups are present in each, as if by some means there had been an occasional connection or communication. Evolution teaches us that animals and plants have been developing from simple



FIG. 1. Distribution of Major Plant Groups.

forms, and that the more complex forms have developed from the simpler ones. The fact that the same large groups are present in each of the major regions of the world is evidence of a common ancestor.

The fact that the same large groups are present in each of the major regions of the world is evidence of a common ancestor. The fact that the same large groups are present in each of the major regions of the world is evidence of a common ancestor.

some land bird which is lost on the open sea. As the sea there are floating logs which may serve as resting places and in this way flying animals may be distributed. A few years ago, during a violent storm, a sea gull fell without not far from Ithaca, New York, at a distance of two or three hundred miles from its ocean home, which was certainly north of Philadelphia. Naturally, because of this aid of wind, winged animals are most widely distributed.

Land animals that cannot fly, distribute themselves by moving over the land, each generation pushing its boundary line farther than the preceding, provided other conditions are favorable. As is stated in the next section, there are certain limitations to this natural spread of life.

THEORY OF THE EARTH

The theory of the earth is a branch of geology which deals with the origin and development of the earth and its various parts. It is a science which seeks to explain the processes which have shaped the earth and its various parts.

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even in the forests. There are foreign weeds in the forests, foreign birds, insects, and mammals (notably the rat), goats, or an unnoted addition to the flora or fauna. The ancient manuscripts are no longer the most important natural possessions of the Australian race, but man has now an invasion of their territory.

Man is killing here and adding there, with the result that intentionally or unintentionally, he is changing the life and landscape while thus interfering with the natural spread of life and, in some cases, succeeding in domesticating plants and animals of one zone to the conditions of another, he is able to disturb the great divisions of tropical, temperate



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with this change in amount of salt, there is a variation in the density of the water. Representing fresh water as 1, the average density of sea water is 1.025. There are many reasons for variation in the salinity of sea water. When rivers enter the ocean, the density is decreased by the addition of fresh water; and also where rains are abundant, they are in the belt of doldrums, the surface water has its density decreased. On the other hand, where evaporation is great, the removal of the fresh water tends to concentrate salts and therefore to increase the density. In the Mediterranean and the Red Sea, the ocean water is relatively dense and the same is true of the belts of ocean water over which the dry trade winds constantly blow.

Color and Phosphorescence.—The color of the ocean is generally blue. This is partly due to the fact that the blue part of the light is reflected upon the water surface, and partly to the absorbing of light rays which enter the water the longer being analogous to that of the blue color of the sky itself. The color of the bottom often imparts to the water a different shade from the typical blue of the ocean, as where the lighter-colored green shades are often produced. The Red Sea owes its color to the presence of many minute forms of vegetation, belonging to the group of algae, and the color of the water near some coasts is due to the presence of great quantities of mud brought down by the rivers.

At times, particularly on quiet nights, the ocean water appears with a greenish glow of light which is known as phosphorescence. It is believed to be due to the glow of life forms which live and die upon the water surface. In the same manner, the water may be sometimes illumined by multitudes of minute animals, which are able to emit a faint glow of their strange light, and thus permit to the observer to help them from below. Therefore we can

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Remarks of the State Surgeon.—It is with great
pleasure that I am able to present to you the
annual report of the State Department of Health.
The report shows that the State Department of Health
has been successful in its efforts to protect the public
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topography, and something concerning the kind of bottom as well as the character of the water, and the various physical conditions. For this purpose, one thing is of prime importance, namely the depth; and in every deep-sea exploration this is the first fact obtained.¹ For this sounding, various ingenious contrivances have been invented, the one be-



adapted to deep-sea work being the Sigbee deep-sea-sounding machine (Fig. 26). A weight attached to the end of the steel wire, is carefully lowered until the bottom is reached. The ball of the sounding machine sinks by its own weight and when it touches bottom

it sends a signal to the observer. The weight is then hauled up by means of a rope and the depth is measured. The Sigbee machine is a very simple and effective device, and is used by the United States Fish Commission for deep-sea soundings.

The Sigbee machine is a very simple and effective device, and is used by the United States Fish Commission for deep-sea soundings. It consists of a vertical frame with a pulley at the top. A rope or wire runs from the pulley down to a weight. The weight has a hook-like end. This is a more complex version of the hand-sounding device. The ball of the sounding machine sinks by its own weight and when it touches bottom it sends a signal to the observer. The weight is then hauled up by means of a rope and the depth is measured.

¹ See also the description of the sounding machine in the preceding chapter.



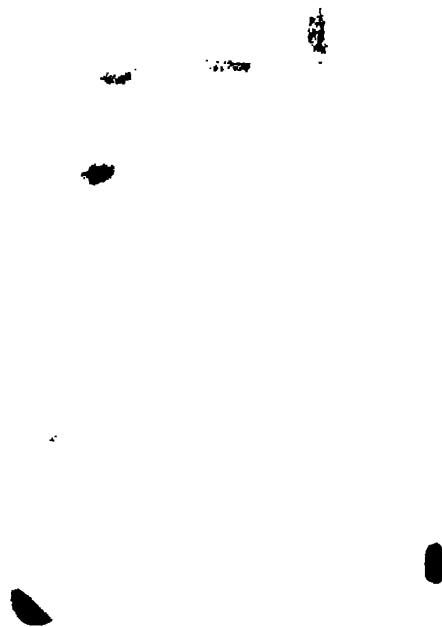
sufficient length of time, it is drawn to the surface and contents exhaled.

Imagine a balloon sailing through the air at a height three miles or more, and dragging a frame a few feet length, over a distance of a few miles. If the operators of this apparatus should imagine that, as a result of a few feet they had obtained a full knowledge of the life existing on the surface of the earth, it will readily be seen that it would be very much mistaken. All writhing moving mice would escape, and only those would be taken which are small enough to enter the dredge, and so show that it could not escape from it. In a moment this is true of all explorations of the deep sea. If large animals exist in

Distance of about 80 miles. Within sight of the shores at a distance of from 10 to 20 miles from land, the ocean reaches a depth of 12700 to 12800 fathoms. Among the sea islands of the Pacific, differences in elevation fully as great as these are frequently discovered. On the land there are such excessive differences in elevation as those which exist among the sea islands of the ocean.



The Atlantic Ocean. — Perhaps the best way to obtain an idea of the topography of the Atlantic Ocean, is to make a section across it, following approximately the line traversed by the oceanic steamship (Fig. 16). Starting from the coast of New York, an even, gently sloping sea floor stretches eastward to a distance of from 20 to 25 miles. It is all level, and the features are rather like those of the very level plains on the land. A gradual rise is then observed, the result of the gradual subsidence including nearly all of the area between the present New England coast and a line about 200 miles from the shore south of New York (the position given in a continental shelf, map



exceedingly irregular. Without entering into the subject in very great detail, these irregularities could not be adequately described; and indeed, our knowledge of the larger part of the ocean floor is so slight, that as yet we know only the general features.

Temperature of the Ocean Bottom.—In the neighbourhood of continents, where the depths of the sea are relatively slight, the temperature is more or less irregular, and determined by local conditions. It changes with the season, and is influenced by the oceanic and tidal currents, and even the prevailing winds.

After passing this shallow and variable zone, very uniform temperature conditions are encountered. As a general rule

the temperature of the water at a depth of 100 fathoms is about 50° F. in the North Atlantic, and 55° F. in the South Atlantic. In the Indian Ocean, the temperature at the same depth is about 60° F. In the Pacific Ocean, it is about 65° F. In the Arctic Ocean, it is about 30° F. In the Antarctic Ocean, it is about 20° F.

The temperature of the water at the bottom of the ocean is generally uniform, except in the neighbourhood of continents, where it is more or less irregular. The temperature of the water at the bottom of the ocean is generally uniform, except in the neighbourhood of continents, where it is more or less irregular. The temperature of the water at the bottom of the ocean is generally uniform, except in the neighbourhood of continents, where it is more or less irregular.

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ness, it still seems certain that some kind of light does exist there. This conclusion is forced upon us by the fact that many of the animals in the depths of the sea have well-developed eyes; and, further, that many of them are brilliantly colored. Animals living in dark caves become blind and it seems hardly probable that those inhabitants of a deep sea would continue to develop eyes for ages after the sun had ceased.

Phosphorescence is a possible source of light on the sea floor. After nightfall, whenever a dredge-haul of material is brought from the deep sea to the surface, it is aglow with the dull white light of phosphorescence. Each animal, or particle of mud, glows with this light.

Materials composing the Deep Floor (Mechanical Materials).—There are two classes of substances applied to the engine bottom, one mainly derived from the land, or the fragments of rock crushed from boulders; the other, the animals which have died in the ocean. The latter constitute the greater part of the ocean floor. The main material fragments of shell which are derived from the sea are almost entirely formed of the remains of the animals in the bivalve class. These are:

Another, the fish. One of the most striking facts in nature would seem to be that the fish covering the bottom of the sea are all dead. The entire world is covered by the dead remains of former animals. Why is this? The answer is that in a few hours we will have a new, complete generation of animals, as it were, on the surface of the globe, and it is only a few minutes more before the dead remains of these will be covered by another generation. The result is that the world is always covered by the remains of former generations, and it is only a few minutes more before the dead remains of these will be covered by another generation.



It is not exclusively made of the remains of the shells of surface animals, but contains contributions from other sources. The most common addition comes from green rocks, which were ejected from volcanoes, and after floating for some time settled to the ocean bottom at some distant point. Therefore, remnants of volcanic ash or pumice is common in the red ooze. Aside from this, there are fragments of meteorites which have dropped to the bottom indicating exceedingly slow accumulation. This ooze covers an area of over 21,000,000 square miles, which is little more than that covered by the Gobi desert. The kind of deposit covers an area equal to about one-fourth the earth's surface.

Life in the Ooze: Pelagic or Surface Fauna.—The ocean is the great meeting ground of the life of the proterozoic—the air, the land, and the water. Forms belonging to all the great groups of the animal kingdom find possible to live in the conditions which exist in the sea. There the conditions of life are remarkably uniform; there are few changes in temperature, and few variations in atmospheric or the food supplies. This alone does, and is sufficient, the surrounding conditions are exactly the same. No great differences exist between the surface faunas of the ocean in different regions, as between the land animals that inhabit and the temperate latitudes. This is partly because the temperature of the water changes very slowly and very slightly, and is partly, in part due to the fact that the waters of the ocean surface are so well mixed, so that the conditions in any section are controlled by events that affect the whole. The conditions of life of the surface fauna of the ocean are controlled by events that affect the whole of the ocean.

The conditions of the conditions of temperature, that is

When a new case arises in the ongoing process of identifying cases and we don't see a paper in print, then the next step is to search for a new source. In the future, we will be able to search for a new source in the future, and we will be able to search for a new source in the future.

other part of the ocean. There is no such momentary conditions as we find at the surface of the ocean away from the land. But from day to day, from season to season, and from place to place, there are very marked differences in conditions upon which the animals depend for their existence and variety. Here, as in every part of the ocean, temperature is a very important cause for differences in life and for variation in animal forms. Even a few degrees temperature will cause a very marked difference in the

abundance and variety of animal life. This is well illustrated in the coast of the Atlantic, where the water is so cold that the number of animals is small, and the variety is limited. In the Gulf of Mexico, where the water is so warm, the number of animals is large, and the variety is great.



the presence of a great pressure of water in the depths of the sea. The more highly organized animals, such as true fishes, are unable to accommodate themselves to a change in condition; and when they are drawn to the surface, they are commonly broken by the expansion of the gases within the body. Their eyes protrude from the head, the air bladder extends from the mouth, and the skin is cracked and floured. Thus while they may live at immense pressures upon every particle of the body, they would be unable to exist when the pressure is removed from the outside, while it still partly remains on the inside.

As a result of deep-sea exploration, it has been found that all the ordinary types of marine animals exist on the sea

bottom, and that the same animals are found at depths of 100 fathoms as at depths of 1000 fathoms. Indeed, it has been found that the same animals are found at depths of 1000 fathoms as at depths of 10000 fathoms.

It is also found that the same animals are found at depths of 10000 fathoms as at depths of 100000 fathoms. This is a very curious fact, and it is one which has not been explained. It is possible that the animals are able to adapt themselves to the pressure of the water, and that they are able to live at depths of 100000 fathoms as well as at depths of 10000 fathoms.

It is also found that the same animals are found at depths of 100000 fathoms as at depths of 1000000 fathoms. This is a very curious fact, and it is one which has not been explained. It is possible that the animals are able to adapt themselves to the pressure of the water, and that they are able to live at depths of 1000000 fathoms as well as at depths of 100000 fathoms.

this is far from being true; and yet they are constantly supplying to the water a certain amount of sulphuric acid which in the course of time would tend to so vitiate water that life would not exist.

This is one of the strongest arguments in favor of a relation of the waters along the bottom of the ocean, polar to tropical regions. There must be some supply of oxygen furnished to these deep-sea animals, otherwise they could not exist; and there is no other supply known but that which may be brought by this great oceanic circulation.

Since everything points to the conclusion that there is no lateral movement along the bottom, it is

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The physician's responsibility in the present day is a subject of increasing importance. The physician is no longer a mere technician, but a person who is responsible for the health and welfare of his patients. This responsibility is based on the fact that the physician is the only person who is qualified to diagnose and treat disease. Therefore, the physician must be held responsible for the results of his actions. This responsibility is not limited to the patient, but extends to the community as a whole. The physician must be aware of the social and economic factors that influence the health of the community, and must take steps to improve the health of the community as a whole.

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CHAPTER X.

OCEAN WAVES AND CURRENTS.

Wind Waves.¹—As a result of friction between wind and water, the ocean surface is readily started in motion in a



FIG. 10. Wind waves.

direction of the wind. The surface of the water is thus broken into small waves, which, as the wind continues to blow, grow in size and number, and finally develop into large, rolling waves.

The first of these is the fact that the United States is a young nation. It has only been about a century and a half since it was first settled by Europeans. This has given it a unique position in the world. It has not had time to develop the same traditions and customs as the older nations. It has also been able to avoid many of the mistakes of the past. It has been able to learn from the experience of other nations and to apply it to its own situation. This has given it a great advantage in the world.



Fig. 10.
The Hudson River.

The second of these is the fact that the United States is a large nation. It has a vast territory and a large population. This has given it a great advantage in the world. It has been able to develop a wide variety of industries and to produce a large amount of goods and services. This has given it a great advantage in the world.

The third of these is the fact that the United States is a free nation. It has a free press and free speech. This has given it a great advantage in the world. It has been able to develop a wide variety of industries and to produce a large amount of goods and services. This has given it a great advantage in the world.

and it dashes upon the coast in the form of a break (Fig. 61). The wave is such a shallow movement in the water that it is readily destroyed upon reaching an irregular coast. Thus in harbors or bays, the violent waves lose their force, largely because of friction upon the shore and bottom.

A very slight breeze will cause a series of wave-like movements or ripples; but as the wind continues, and its force increases, the water surface may be thrown into a series of great undulations. The water is so mobile that these movements are transmitted for great distances, and they often extend far beyond the place of origin. This may be illustrated upon the surface of almost any lake or

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The Alabama Railroad is a very important one in the state. It is the only one that runs from the Gulf of Mexico to the interior of the state. It is the only one that runs from the Gulf of Mexico to the interior of the state. It is the only one that runs from the Gulf of Mexico to the interior of the state.



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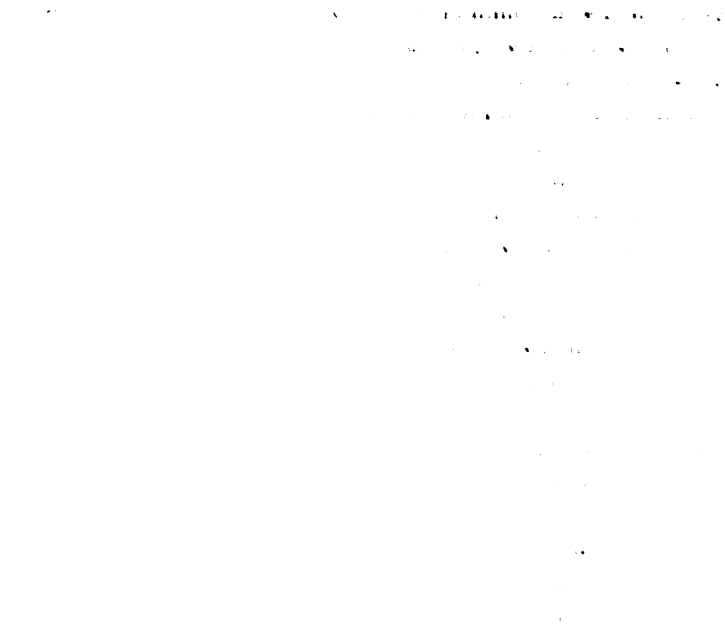
If we watch the rubbing of the waves against rocks, or the breaking of the rollers upon the steep beaches, we are able to form some conception of the amount of destructive work that these waves are able to do in the course of long periods of time. With every rush of the water upon the beach, pebbles and sand are dragged backward and forward; and this constant friction of a particle upon another, in the course of time will cause even the hardest rocks to wear away. In the course of a 50 years fragments of brick or glass become rounded, so that they resemble the form of the true beach pebbles; and in year or two a brick may be reduced to a pebble only a small fraction of the size of the original.

Earthquake Waves. — When an earthquake shock starts the waters of the ocean, a great wave is formed, which extends from the bottom of the sea to the surface, in which is therefore much more profound in its effect than a shallow wind wave. In the mid-ocean these earthquake waves may not be perceptible, but as they reach shallows, their mass becomes noticeable as their disruption is apparent in the shoaling water. Upon reaching our coast from the great depths they may have a height from 20 to 100 feet, which gives them the power of action upon the shore in a much greater distance than ordinary waves are capable of reaching.

Through narrow valleys, usually the water upon a mountain side runs in a rapid and unobstructed course of descent to the sea. Fortunately the force of ocean earthquakes upon such a large body of water is not so intense as it is upon a small body of water, and the coast of North America and the West Indies have been comparatively well spared

(Plates 15 and 17). As in the case of the atmosphere, its regularity of distribution is interfered with by many causes, mainly the influence of land, and air and water movements (Plates 15 and 17). The influence of the ocean currents is shown in both of these maps, and they also are the greater regularity of the ocean surface isotherms in the southern hemisphere, where there is little land.

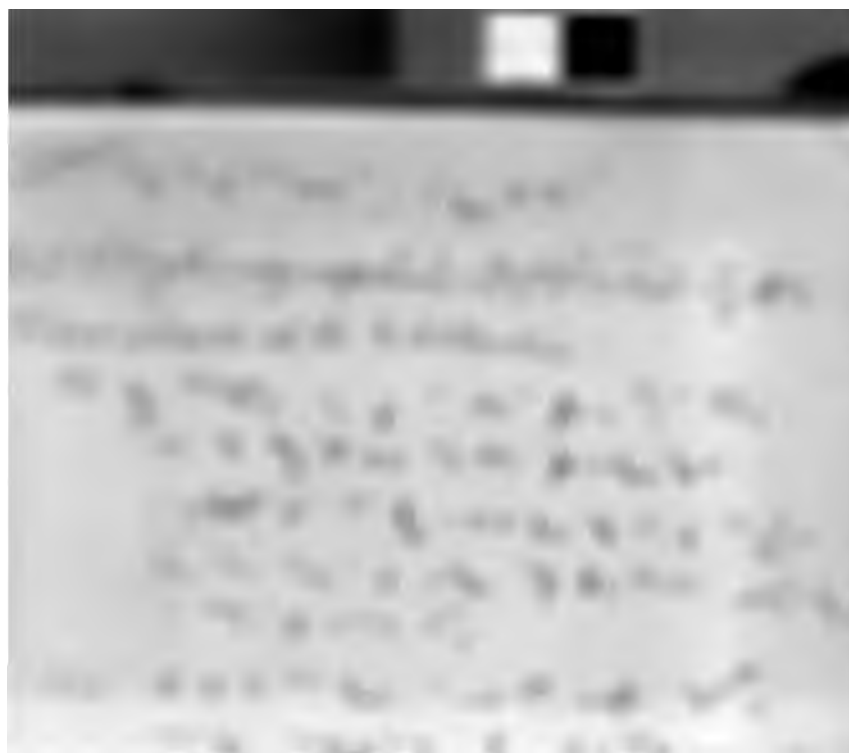
Near the coast the temperatures of its ocean surface are subjected to very sudden variations. This is particularly true in its temperate zones, where the difference between summer and winter temperatures is very great. Thus, on the New England





little reason for decided changes in temperature, either between the day and night, or between the seasons.

Ocean Currents: Planetary Circulation.—As a result of differences in temperature between polar and tropical regions, the air is engaged in a series of great movements. There are many reasons for believing that a similar circulation exists in the ocean. The fact of the difference in temperature suggests the probability of such a circulation which would consist of a rising of the water near the equator, a surface outflow from equatorial to polar regions and then a downsliding to the bottom, from which there would be a return to the equatorial regions along the bottom.





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the country, the population is estimated at 1,000,000. The country is divided into 100,000 square miles, and is the capital of the country. The country is divided into 100,000 square miles, and is the capital of the country.

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layers of water would cause sufficient expansion to necessitate their rise to the surface; but this is not the case.

If temperature differences account for ocean currents, the fact of the greater development of the system in the southern oceans would be difficult to explain. The Antarctic is practically open to both Atlantic and Pacific, and in the hemisphere there is an excellent opportunity for an exchange of polar and tropical waters. But the Arctic is almost completely shut off from the Pacific, and is only open to the Atlantic through narrow and rather shallow channels. Therefore, in the hemisphere where the least favorable conditions for an exchange of water exist, we have the best developed currents. In the North Pacific there seems almost entirely no chance for the general passage of cold surface waters along the bottom to the equator.

Two and other reasons, such for instance as the presence of all surface currents returning from the Arctic and Pacific, lead us to the conclusion that the temperature does

not account for the existence of the ocean currents. The fact that the currents are not confined to the surface, but extend to the bottom, is another reason for rejecting the temperature theory.

The fact that the currents are not confined to the surface, but extend to the bottom, is another reason for rejecting the temperature theory. The fact that the currents are not confined to the surface, but extend to the bottom, is another reason for rejecting the temperature theory. The fact that the currents are not confined to the surface, but extend to the bottom, is another reason for rejecting the temperature theory.

one of the most rapidly moving of ocean currents, and its rapidity depends upon the peculiar effect of convection.



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the first of these is the fact that the United States is a young nation, and its history is a history of growth and development. The second is the fact that the United States is a large nation, and its history is a history of expansion and conquest. The third is the fact that the United States is a diverse nation, and its history is a history of conflict and compromise.

These three factors have shaped the history of the United States in many ways. First, the fact that the United States is a young nation has led to a sense of optimism and hope. Second, the fact that the United States is a large nation has led to a sense of power and confidence. Third, the fact that the United States is a diverse nation has led to a sense of unity and solidarity. These three factors have also led to a sense of responsibility and duty. The United States has a duty to its people, to its neighbors, and to the world. It is this sense of responsibility and duty that has made the United States a great nation.

The history of the United States is a story of many things. It is a story of growth and development, of expansion and conquest, of conflict and compromise. It is a story of hope and optimism, of power and confidence, of unity and solidarity. It is a story of responsibility and duty. The United States has a long and proud history, and it is a history that we should all be proud of. The United States is a great nation, and its history is a story that we should all be proud to tell.

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The first of these was the fact that the United States had a large and growing population. This was due to a number of factors, including a high birth rate, a low death rate, and a large influx of immigrants from Europe. The second factor was the fact that the United States had a large and growing economy. This was due to a number of factors, including a large and growing population, a large and growing market, and a large and growing supply of raw materials. The third factor was the fact that the United States had a large and growing military. This was due to a number of factors, including a large and growing population, a large and growing economy, and a large and growing supply of raw materials.

THE UNITED STATES IN THE WORLD

The United States has been a major power in the world since the end of the Second World War. This is due to a number of factors, including a large and growing population, a large and growing economy, and a large and growing military.

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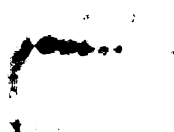
The United States has been a major power in the world since the end of the Second World War. This is due to a number of factors, including a large and growing population, a large and growing economy, and a large and growing military.

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water in the southern hemisphere, than in the north. The continents interfere with the movement of the sea and in some cases successfully check it. When the sea enters the Atlantic, its direction is changed from west to north, and soon the wave is so changed that it advances more rapidly in the middle part of the ocean than on the margins (Plate 18). This is due to the effect of the shallower waters near the continents. The wave is retarded near the shores and advances more rapidly in the central portion of the ocean. As a result of this, the crest of a wave may be reached the latitude of Newfoundland at the same time if the margins are affecting the coast of northern Africa or the West Indies.

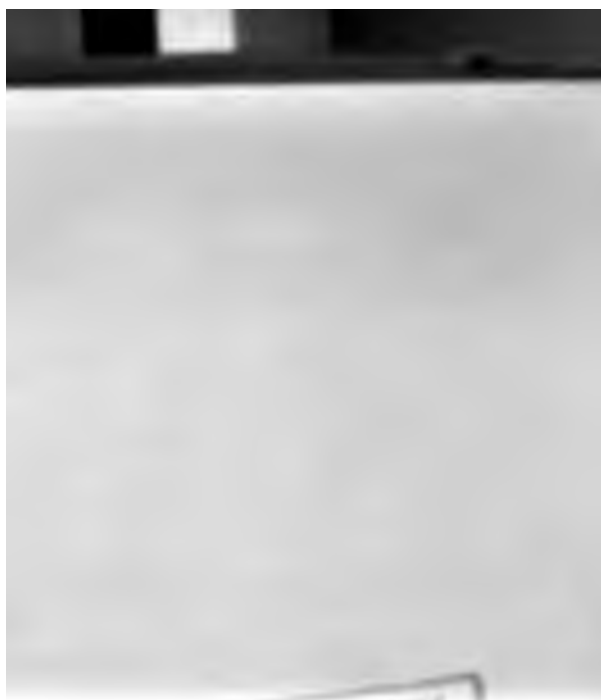
In a similar way this effect of friction is also shown in the Gulf and larger estuaries. Thus as the water passes up the Gulf of Mexico, it is retarded by the shallower waters of the Florida current in the northern part of the bay the wave arrives later in the Gulf.

Friction and the effect of the land on the movement of the water is also shown in the Pacific Ocean (Plate 19). The water enters the Pacific from the Atlantic and Indian Oceans and advances more rapidly in the middle of the ocean than on the margins. The water is retarded near the shores and advances more rapidly in the central portion of the ocean. As a result of this, the crest of a wave may be reached the latitude of Newfoundland at the same time if the margins are affecting the coast of northern Africa or the West Indies.











Nantucket, is one of relatively rapid tidal currents. The rapid currents in the straits between two such bodies of water, may be called tidal races.

A tidal race is produced at Hell Gate, near New York City, mainly because the tide runs higher in Long Island Sound than it does in the bay of New York Harbor (Figs. 84 and 85). The very rapid currents in this shallow mouth, in part due to this cause, and in part to the fact that the time of high tide is different on the two sides of Hell Gate. Similar tidal races occur on many parts of the European northern shore, and at times currents are produced which are as violent as rapidly moving streams. In some cases

the currents are so strong that they are dangerous to navigation. In the English Channel, for example, the currents are so strong that ships are often driven off their course. In the North Sea, the currents are so strong that they are dangerous to navigation. In the Baltic Sea, the currents are so strong that they are dangerous to navigation. In the Black Sea, the currents are so strong that they are dangerous to navigation. In the Mediterranean Sea, the currents are so strong that they are dangerous to navigation. In the Red Sea, the currents are so strong that they are dangerous to navigation. In the Persian Gulf, the currents are so strong that they are dangerous to navigation. In the Indian Ocean, the currents are so strong that they are dangerous to navigation. In the Pacific Ocean, the currents are so strong that they are dangerous to navigation. In the Atlantic Ocean, the currents are so strong that they are dangerous to navigation. In the Arctic Ocean, the currents are so strong that they are dangerous to navigation. In the Antarctic Ocean, the currents are so strong that they are dangerous to navigation.

THE TIDAL RACE AT HELL GATE.

The tidal race at Hell Gate is one of the most rapid and violent in the world. It is produced by the difference in the height of the tide in Long Island Sound and in the bay of New York Harbor. The tide runs higher in Long Island Sound than it does in the bay of New York Harbor. This difference in the height of the tide produces a strong current in the strait between the two bodies of water. The current is so strong that it is dangerous to navigation. In some cases, the current is so strong that it is dangerous to navigation. In the English Channel, for example, the currents are so strong that ships are often driven off their course. In the North Sea, the currents are so strong that they are dangerous to navigation. In the Baltic Sea, the currents are so strong that they are dangerous to navigation. In the Black Sea, the currents are so strong that they are dangerous to navigation. In the Mediterranean Sea, the currents are so strong that they are dangerous to navigation. In the Red Sea, the currents are so strong that they are dangerous to navigation. In the Persian Gulf, the currents are so strong that they are dangerous to navigation. In the Indian Ocean, the currents are so strong that they are dangerous to navigation. In the Pacific Ocean, the currents are so strong that they are dangerous to navigation. In the Atlantic Ocean, the currents are so strong that they are dangerous to navigation. In the Arctic Ocean, the currents are so strong that they are dangerous to navigation. In the Antarctic Ocean, the currents are so strong that they are dangerous to navigation.



are pulling upon the earth at an angle, and these unequal pulls or low tides, known as *neap tides*, are produced.

In the movement of the moon around the earth, it follows a path which is quite elliptical. Therefore, since the earth is at one of the foci, there is a time during every lunar month when the moon is much nearer the earth than when it is in the opposite part of its elliptical path. When the moon is nearest to the earth, it is said to be in *perigee*, and when farthest from the earth, in *apogee*. Since the tide-producing force varies greatly with the distance, this difference in lunar distance produces a very marked effect upon

Where the tide rises in the mouths of rivers or in estuaries, as in Chesapeake and Delaware bays, the rise of the tide checks the river water, and causes it to deposit what sediment it is carrying, so that this effect is also important in modifying the bottom of these bays (Fig. 90). These harbors are being filled by this means, and millions of dollars are every year expended in attempting to remove the sand and mud deposited by this tidal action.







[illegible]

the first of these was the fact that the United States had been a member of the League of Nations since its inception in 1919. This was a significant achievement, as it showed that the United States was committed to international cooperation and peace. The second factor was the fact that the United States had a strong military and economic position in the world. This gave the United States the ability to influence other nations and to maintain peace.

The third factor was the fact that the United States had a strong moral position in the world. The United States had been a leader in the fight against slavery and for civil rights. This gave the United States the moral authority to lead the world in the fight against war and for peace. The fourth factor was the fact that the United States had a strong diplomatic position in the world. The United States had been a member of the League of Nations since its inception in 1919. This gave the United States the ability to influence other nations and to maintain peace.

The fifth factor was the fact that the United States had a strong cultural position in the world. The United States had been a leader in the development of modern culture. This gave the United States the ability to influence other nations and to maintain peace. The sixth factor was the fact that the United States had a strong political position in the world. The United States had been a leader in the development of modern political thought. This gave the United States the ability to influence other nations and to maintain peace.

The seventh factor was the fact that the United States had a strong economic position in the world. The United States had been a leader in the development of modern economic thought. This gave the United States the ability to influence other nations and to maintain peace. The eighth factor was the fact that the United States had a strong military position in the world. The United States had been a leader in the development of modern military thought. This gave the United States the ability to influence other nations and to maintain peace.



FIG. 10

Rounded rocks on the plains of Kansas.

often very complete. These changes commonly consist of two forms, either (1) rolling, or (2) towering, which are both striking.

From the same cause of (1) rolling, we have (2) towering. The region of the rolling, which is the most common, is the result of the gradual subsidence of the land, and the consequent accumulation of the rocks in the center of the depression.

and 100 and 200 ft. They have been badly eroded, and very little water runs. In some cases, and low precipitation elsewhere, the rocks have been worn down to their original position, and can be seen in the distance, which is



FIG. 11

Undulating land.



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the rock would require the dip, and the dip, or any line parallel to it, the strata.

In some cases, rocks break or fault, instead of folding (Fig. 18), and some beds gradually change in bed. There is much complexity in bedding, particularly when the bed extends across rocks that have already been folded, and so some of the beds may be



center of the volcano, because filled with solid lava when the volcanic action ceases; and sometimes it rises to meet the surface along other planes, breaking the rock open and filling the cracks with lava, forming *dikes* (Fig. 19). These are very abundant in regions of volcanic action, and they often occur in places where such action was once present being the roots of old volcanoes. Such dikes are extremely



abundant in New England where they may be seen in great numbers cutting across the rocks of the mountains.

In some of the highest parts of the earth, in the mountainous regions, these volcanic masses are of great importance being in fact roots. These great roots of volcanic mountains are illustrated by the great roots of Mount Vesuvius and



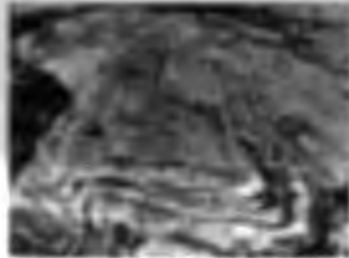
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course, because they could not cool so rapidly. These igneous rocks vary in two ways, in composition and in the local composition, and hence in mineral constitution. All these varieties are given names, but their study belongs to geology.

Metamorphic Rocks.—Though they were not such metamorphic rocks resemble the igneous in the fact that they are formed through the partial agency of heat, and the fact that they are crystalline. They are the least important group, but in some places, such as New England and Canada, they are the most common of rocks. They are formed in the interior



THE HISTORY OF THE WORLD

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THE HISTORY OF THE WORLD, FROM THE FIRST BEGINNINGS OF MANKIND, TO THE PRESENT TIMES. BY SAMUEL JOHNSON, ESQ. VOLUME THE FIRST. LONDON, Printed by J. DODD, in Pall-mall, 1710.



THE HISTORY OF THE WORLD, FROM THE FIRST BEGINNINGS OF MANKIND, TO THE PRESENT TIMES. BY SAMUEL JOHNSON, ESQ. VOLUME THE FIRST. LONDON, Printed by J. DODD, in Pall-mall, 1710.

particularly near the coast, because here the waves bottom as quiet that the particles must settle. In quiet bays, a fine-grained rock may be deposited close to the shore; on more exposed coasts, the sediments of the shore line



siltstone
shale
sandstone
claystone
siltstone
shale
sandstone

coarse-grained, and as the distance from the coast increases, they become finer in texture. Since the waves bottom usually nearly level, these fragments spread out in layers which are usually horizontal, though where the bottom is inclined, the layers are inclined with it. Sometimes the supply of sediment runs either in amount or in kind, and sediment may be deposited in another place, thus giving the distribution that is

shown in the following diagram. The sediment is shown in the form of a wedge, the base of which is at the coast, and the apex is at the mouth of the river.

The diagram shows a cross-section of a river delta. The river enters from the left and spreads out into a fan shape. The sediment is shown as a wedge, with the base at the coast and the apex at the mouth of the river. The layers of sediment are shown as horizontal lines, with the coarsest layers at the base and the finest layers at the apex. The diagram illustrates how the supply of sediment can vary, leading to different textures and structures in the delta.

Bricks are consolidated by heat, and in the earth heat also acts in a similar manner. All rocks in the earth are full with water which is slowly percolating through them. The water is dissolving substances from one place and depositing them in others, and in this way many rocks are being consolidated. Carbonate of lime and some compounds of it are the common rock cements; and these, perhaps aided one of the other causes, bind the rock particles together.

Geological Chronology. — By a study of the rocks, the facts of geological history have been determined in a more or less satisfactory manner. We know something of the history of the globe, and the rocks form the pages and the text of this history. The rock record is often very long

divide the history into stages, each stage representing an advance in the development of life on the globe. For this purpose, names are used to signify the stages, as is indicated in the table below, which is a simple one from which it

TABLE OF ORIGINIAL AGES.

ORIGINIAL TIME. Age of universe.	Quaternary	Man appears for the first time (probably in the upper part). In the lower half the life of the Tertiary period.
	Tertiary	Mammals develop to considerable extent and in great size, while reptiles flourish.
		Reptiles begin to become important, while the life of the Tertiary period is at its height. Mammals begin to appear in great numbers and in great size.

even hundreds of thousands, but millions and probably to deeds of millions of years. The evidence is overwhelming and no geologist finds reason to doubt it.

The gorge of Niagara, 200 or 300 feet deep, and 7 mi long, has taken not far from 10,000 years for its formation; how much longer was the time occupied in forming the side of the Colorado, whose length is 200 miles, and whose top to place is over a mile? Yet these were but two of the stages in the development of the continent.

We watch a volcano for a century, and, at the end of it time, find its general form to be the same as at the beginning; yet most of the volcanic cones of the world so began not earlier than the commencement of the Tertiary.

Studying the rate of deposit of the sedimentary rocks of the ocean, we find that, even when the deposit is equally one foot a few feet, are laid down in a single century; and, when the rate is slower, a hundred feet of rocks have been laid down in a single century. At the opposite extreme, the rate of deposit is so slow that it takes many centuries to lay down a few feet of rocks. These are the conditions of the deposition of the sedimentary rocks of the ocean.

It is not surprising, therefore, that the rate of deposit of the sedimentary rocks of the ocean is so slow that it takes many centuries to lay down a few feet of rocks.

CHAPTER XIII.

DETRITATION OF THE LAND.

Underground Water. — When rocks are deposited in layers, the crevices between the particles of sediment are filled with water. In even the densest of rocks there are crevices, and through all of these, water is slowly percolating as underground water. Added to the supply originally in the rocks there is a constant body of water entering at the surface. When rain falls upon the land, a part is retained on the surface by evaporation, a second portion flows away as surface water, and a third part sinks into the ground. The first part is evaporated, the second portion flows away as surface water, and a third part sinks into the ground. The third part is percolated through the pores of the rocks, and forms a body of water which is called underground water. This water is constantly being added to by the rain which falls upon the land, and forms a body of water which is called underground water. This water is constantly being added to by the rain which falls upon the land, and forms a body of water which is called underground water.

The first of these is the fact that the United States is a young nation, and its history is therefore a history of growth and development. The second is the fact that the United States is a large nation, and its history is therefore a history of expansion and conquest. The third is the fact that the United States is a diverse nation, and its history is therefore a history of conflict and compromise.

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escape of certain gases which gave to it much of its power; and it is often the result of chemical changes in the presence of the air. Even in the earth, for one reason or another, the water at times deposits some of its dissolved load. This is one of the ways in which rocks are cemented; and it appears to be one of the causes for the formation of some of the valuable mineral deposits.

Underground water is also engaged in the work of changing some of the minerals of the rocks. It actually causes a decay of some minerals, and brings about very important changes in others. This is one of the ways in which the rocks are broken into fragments, and soils formed. The

The following is a list of the members of the American Medical Association who have been elected to the office of President of the Association for the year 1935.



DR. J. H. HAYES, President of the American Medical Association, 1935.

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road. They are formed because on entering the cave the water loses some of the carbonic acid gas which gave to it its solvent powers, and thereby has a



ability to hold its solution increased. By the gradual lowering of the floor, the rocks & these caverns are sometimes destroyed, and the streams the occupy them are changed to surface rivers. Where a part of the roof remains, a natural bridge is sometimes formed (Figs. 136 and 137).

Springs and Artesian Wells.

Water generally issues from the ground in the form of springs. It may be brought to the surface by artesian wells. The water in these wells is under pressure and rises to the surface without the aid of a pump.





pressure; and this is sufficient to force it upward toward the surface, to a height nearly as great as that of the place where the water enters the ground.

If this water-bearing layer is pierced by a well-bore the water will rise in the well as high as the pressure can force it; and if the place at which the well is bored



FIG. 113.
Condition bearing situation with (a) a, (b), where the water can surface at
single pressure. From south side of the Department of the Interior.

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PHYSICAL GEOGRAPHY.



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quartz grains in sandstones that have been produced by decay of rocks in which quartz was one constituent. The clay of such rocks as shale is usually the product of rock decay. Another result of these changes is to find dissolved mineral substances in river water, and hence, the sea.

Of the mechanical agents, perhaps the most important that of change in temperature, which, however, affects in the very surface rocks. In the regions which experience great temperature ranges, the rocks become warmed during the day and cooled at night. This introduces an alternate expansion and contraction, which causes fragments to split from the rock surface. If the temperature fluctuates between the freezing point and the boiling point of water, the high temperature and water softens the rock, and the rock contracts as the water freezes, causing fragments to separate. Fragments are given off.

The fragments are given off in the form of small pieces (Fig. 1) and are carried away by the wind or water. The fragments are given off in the form of small pieces (Fig. 1) and are carried away by the wind or water. The fragments are given off in the form of small pieces (Fig. 1) and are carried away by the wind or water.

It is also in regions where a deep soil covering protects the rocks. Upon exposed ledges, weathering is rapid; and this is particularly true of cliffs, where the fragments drop to the base in the form of a talus (Figs. 118, 121), leaving the rock-face bare to future attacks. Thus also, weathering is more rapid in some kinds of rocks than in others.



In man is the formation of soil. In many parts of the world the soil is the result of rock disintegration (Fig. 133); in some places, particularly in the tropics, this residual (so called because it is largely composed of the waste material of rock decay) has a depth of 100 or 200 ft. In this country it is of particular importance in the South States, the soil of the Northern States being largely the result of glacial action, and being a transported soil. *Another important effect of this rock decay is that it furnishes much of the material for the formation of the soil.*



the mountain bases. This form of erosion merges into that of rivers. In some places (Plates 20, 21, and 22) rain-erosion has carved the soft clay of the arid lands into a series of fantastic and remarkable forms.

Gravity is an important factor in this and other kinds of erosion; but even when modified by any of the agents of





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carry substances in solution, but some have a little, and others carry great quantities; and in desert regions, rivers are sometimes so full of dissolved substances, that the water tastes bitter or salt.

Armed with its load of sediment, the river cuts the bed of its channel, and deepens its valley; and by swinging its



one side to the other, it broadens the valley slightly. Thus by erosion, there is produced a wide, deep, narrow channel, a gorge, or a valley, and the water, when released, is of little use. This is the process of the river valley.

sediment. With the hardness of the rocks there is also variation; for a river cannot cut its channel so rapidly in a hard granite as it can in a soft clay.

From this it will be seen, that the rate and kind of work that a stream is doing, varies greatly according to circumstances; and it follows that river valleys must present very different characteristics. Some are narrow, others broad; some deep, others shallow; some have rapid slopes, others have a gentle flow, etc. In carving the land, rivers assume





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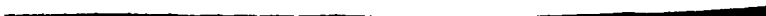
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upon the hills and valleys as unchanging and unchangeable but rather as things of life, with a past history to be read and a future to be predicted.

REFERENCE BOOKS.

Aside from those to which reference has been made at the close of preceding chapters :—

Lyell. — *Principles of Geology*, Vols. I and II. Appleton & Co., New York. Eleventh edition, 1875. 8vo. \$5.00. (This is the great peritopeal the epitome complete on the subject of Geology.)

Shaler. — *First Steps in Geology*. Houghton & Co., Boston, 1892. 12mo.

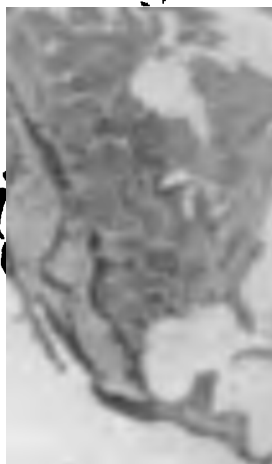


same difference in size between the eastern and the western group of continents. The American continents have an average breadth of but little more than 2000 miles, while the average breadth of Europe and Asia combined, is 2500 miles.

As has been described in Chapter IX., the eastern land-mass part consist of great submerine plains or plateaus, and these broken by greatly rising ridges, or occasionally by steeply rising volcanoes or sharp mountain ridges. The









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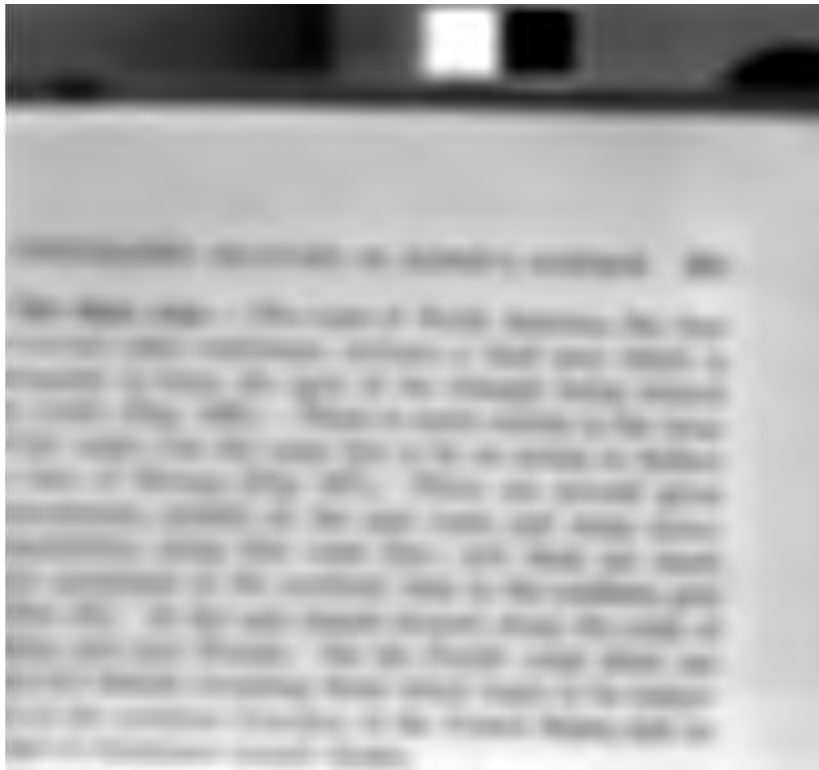
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CHAPTER XV. RIVER VALLEYS

General Description.—A river is a natural drainage line on the land, and is usually occupied by water which has certain well-defined characteristics.



The entire body of water in the valley is called a river, and is usually occupied by water which has certain well-defined characteristics. The entire body of water in the valley is called a river, and is usually occupied by water which has certain well-defined characteristics. The entire body of water in the valley is called a river, and is usually occupied by water which has certain well-defined characteristics.



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these differences in streams, the two most important being the position and kind of rock in which they occur, and the stage in development which they have reached.

Only a very few years ago, river valleys were believed to have been formed by some earth contraction, or some unusual force, and it was thought that rivers occupied these



FIG. 1.
A typical
river valley.



down a slope, in its erosion the river reaches lower levels near its mouth than higher up in its course. Until line of easy slope is reached, erosion expands outward (Fig. 134) ; but then, since erosion is checked while wearing continues, the latter produces its most marked effects and the valley gradually broadens, while the hills slowly





20

21

22



the gorge or cañon (Figs. 136, 137); and among mountains, where the elevation and slope are great, erosion or *erosion* weathering that the gorge is the characteristic valley (Fig. 134).

During the time when erosion *erosion* weathering,—that is during youth,—the resulting valley is deep and relatively narrow; and whenever we see this kind of valley, we see





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increase. With the broadening valley, and the decrease river slope, the conditions favoring floodplains are being about 1, and since the first and most rapid development is in the lower part of the river, in this stage the valley may consist of three quite different parts,—a lower flood-plain course, a middle portion, and an upper terraced part, with



gorges and waterfalls. If majority of streams have reached this stage, it is this is why, in describing a river, it is commonly said that it consists of the

three parts:—the lower flood-plain stage, the middle portion, and the upper terraced part. The lower flood-plain stage is the stage of the river where the river is wide and flat, and the river is winding. The middle portion is the stage of the river where the river is winding and the river is not wide. The upper terraced part is the stage of the river where the river is winding and the river is not wide.



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While the prevailing type of mountain stream valley is that of the gorge (Fig. 124), there are mountain valleys of great breadth and depth. These are not true stream valleys but great synclinal valleys of rock folding (Fig. 140) into the rivers have occupied because of their convenient location. After passing through a deep delta (Fig. 144), a tiny stream may emerge into one of these great, park-like valleys (Fig.





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A still more important cause for the change of altitude found among tilted rocks. If the layers of a series of strata stand in the monoclinal attitude, and if these alternate

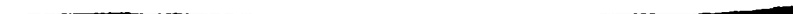


hardness, the softest will be weathered more rapidly than those which are hard, and which, because of this fact, tend to remain above the general level (Fig. 200). In such a case, the high points are not only the

highest, but they are also the most prominent. The high points are not only the highest, but they are also the most prominent. The high points are not only the highest, but they are also the most prominent.



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of its development, the different parts of a river may experience entirely different accidents, and the resulting valley will be complex or composite. Any single part of a river may also suffer a variety of accidents.

Land Movements.—Land movements are among the most common accidents which interfere with normal development and these are of three kinds: (1) broad uplifts, (2) downward movements, (3) folding which accompanies mountain formation. With the general uplift of a country, rivers are given new life, or rejuvenated, and we may then find a narrow gorge cut in the center of a broad valley. The long period of denudation the uplift gives new power





The change in climate which produces glaciation, covers all the country with ice and buries the valleys. In the margin of the snow-covered area, streams may be separated, and an entire change in the drainage be caused.





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because in the conflict between denudation and the forces of elevation, the latter are more powerful and in the streams either constantly or intermittently at work valley formation.

REFERENCE BOOKS.

From the text books of geology, previously referred to, one may get additional information upon some parts of the subject treated in this chapter. Important articles on the Development of Rivers will be found in the National Geographic Magazine, Washington, D.C., Volumes I and II. We are from the pen of Professor W. M. Davis. This magazine is a very valuable one for teachers of geography. We likewise have some published



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present to distribute the sediment over the ocean bottom. Nearly tideless seas, such as the Gulf of Mexico (Fig. 11) or the Mediterranean, are particularly liable to have this opposite the stream mouths.





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roughly triangular, or like the Greek letter Delta (Δ) whence its name. This is really a partial though somewhat distorted cone, not unlike the fan delta itself (Fig. 107).

Floodplains. — Rivers are very often given more land than they are able to carry, and of necessity they are obliged to deposit some. The material



FIG. 106.

Diagram to show the mode of formation of a floodplain.

sometimes deposited the form of bars in the stream channel, or other times it is spread over the valley at one side of the

channel, or it may be deposited in the form of a fan delta, or other times it is spread over the valley at one side of the



[REDACTED]



[REDACTED]

Sometimes the broad floodplain is in part a delta, which has been left inland by the encroachment of the delta upon the sea. In the Mississippi valley, the delta began to form about the northern limits of the state of Mississippi, and has grown outward into the Gulf, filling the estuary which existed there, and transforming it to a broad floodplain; as we now find it. This change is something like that which would happen if the stream now entering Chesapeake Bay





in position. The river is eating its way into the flood-plain on the convex bank, and depositing upon the concave bank



(Figs. 128-130), as at the dotted arrow (sand and silt deposited). The process of change of course the river is across the narrow neck of land between two points of the curve, and it shortens the course, abandoning the old one.

In delta and flood-plain regions, there are no regular channels.



tributaries in a course nearly parallel to the stream, which it would join; and in some rivers, the tributary stream is even so far deflected that they enter the sea independently.

Waterfalls. — When for any reason a stream has a sudden descent in its channel, waterfalls or rapids are produced (Figs. 141-146); and we cannot separate the two phenomena, because there is every gradation between them. There are many ways in which an unnaturally steep slope may be introduced into the stream channel. One of the most common means is by the accidental diversion of the stream from its course. The great majority of waterfalls in the world have been produced by changes in stream courses. The great part of some waterfalls are part of glacial deposits, a result of those glacial circumstances. In 1855, a large number of waterfalls were seen in the North American continent.





are, the time occupied in cutting the gorge from Quaternary to the base of the falls, is somewhere between 7000 and 10,000 years. The falls of St. Anthony, in the Mississippi valley, are of the same origin, and have had nearly the same history; and the same is true of a vast number of waterfalls in the northern states of the Union.

Any other obstacle in the way of a stream will convert it into a waterfall, such for instance as the falling of snow-





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been newly added to the continuous, when flood with rain are turned into lakes. This is the origin of the large number of lakes in Florida, and of Lake Okechobee in the Everglades. Others may be produced during soil incision of the natural development of streams. Such lakes as the yellow cut-offs described above (Figs. 137 and 138) or those formed by the irregular growth of deltas (Fig. 135) are dependent upon the development of streams.





cut down, and thus the lake be speedily drained. On its
issue emerging from the lake, the stream finds itself precipi-
tated over some steep slope; its power of working is so con-
centrated by this waterfall, that it rapidly wears a channel
as has been done by Niagara between Queenstown and the
falls. Niagara is wearing back its falls towards Lake Erie
and given time, as a result of this concentration of work, it
will so lower the outlet as to completely drain Lake Erie.

Lakes may be partially or entirely destroyed by evapora-
tion, as has been the case in the great interior basins of the





THESE CONCLUSIONS ARE
BASED ON THE FACTS THAT THE
RECORDS OF THE BUREAU OF
THE ARMY AND NAVY DEPT.
DO NOT CONTAIN ANY RECORD
OF THE NAME OF THE PERSON
WHO WAS THE FIRST TO
USE THE WORD "NUT" IN
A JOKING MANNER. THE
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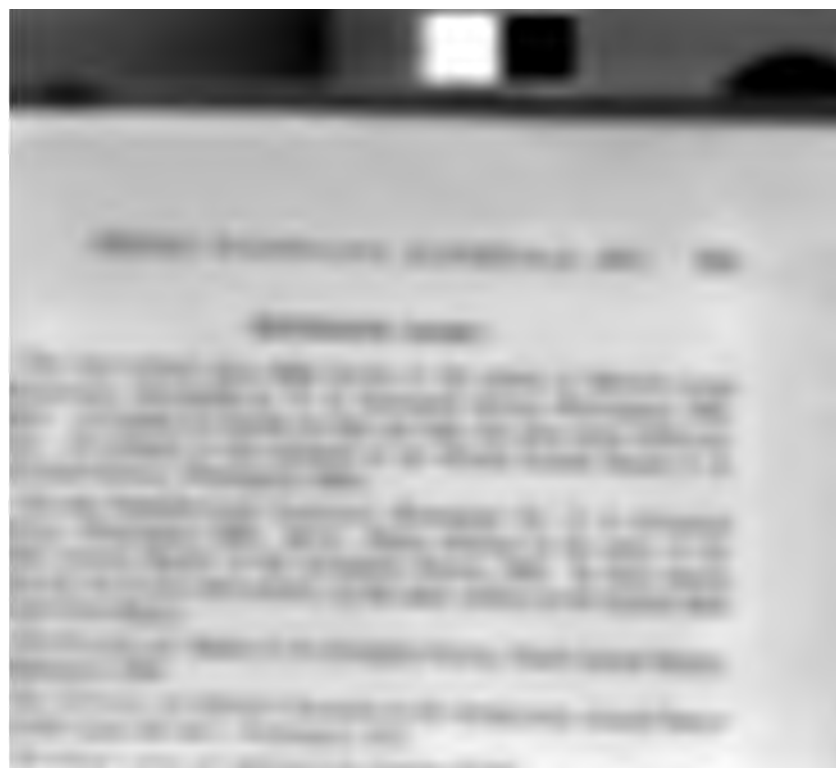


than the down-cutting of the outlet. In the glacial belt of northern United States, where lakes of all sizes were born when the ice retreated, we find abundant illustration of one stage in the destruction of lakes. The more shallow of them have been transformed to swamps, which are usually a fit



stage in the process of lake destruction (FIG. 172). After the sea level has elevated the bottom of the lake nearly to the surface of the sea, vegetation commences

grow and the process

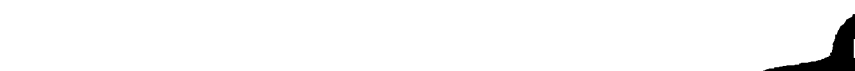


CHAPTER XVII.

GLACIERS.

Cause of Glaciers. — A glacier is an accumulation of ice for the most part solidified into ice, which is subject to a slow movement from one place to another. When snowfall is so great that the weight of snow on the surface is sufficient to cause it to move, it is called a glacier.





mountain valleys, and is particularly well developed on the Alps (Fig. 171). We also find valley glaciers on most of the mountains of Alaska (Plate 20), in the Columbia, in some of the high mountains of Washington such as Mt. Shasta (Fig. 174), and in several places the Sierra Nevada (Fig. 177). The glaciers of the U.S. are small and insignificant, but those of Alaska are among the best developed in the world. Valley glaciers are not common in the U.S. except in the Sierra Nevada.

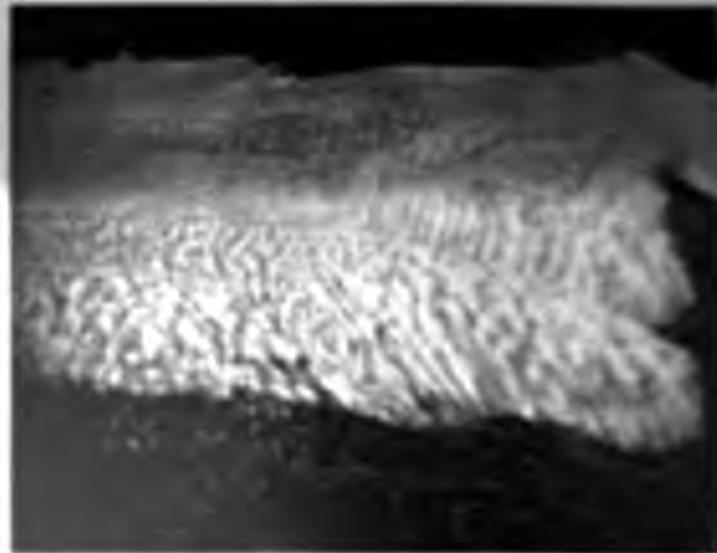


the best developed in the world. Valley glaciers are not common in the U.S. except in the Sierra Nevada.

1. The glacier is a large body of ice flowing down the mountain side.



of rock material. Some of this is supplied from the valley sides, which are subjected to the action of weathering, and from which avalanches are not uncommon. As a result of this, the margin of the valley glacier is usually lined with rock fragments, to which accumulation the name lateral moraine is given. Where two valley glaciers meet, the





from beneath. This material also is carried by the ice down the valley in the form of a *ground moraine* (Fig. 176). After a while, the glacier comes to an end at the place



FIG. 176.

Action of a glacier. M, mountain; T, terminal; and G, ground moraine.

where the melting is equal to the supply of ice. Most of the material that was brought on the

back of the ice, or beneath it, is deposited at the front margin, forming a *terminal moraine* (Figs. 177 and 178).





there is some reason for thinking that it is nearly even all in depth, even at the margin, while in the interior it depth may be over five miles. But about the actual conditions existing on this sheet of ice we have very little knowledge, for this part of the world is almost entirely unexplored.

Within a few years, our information concerning the land ice sheet has become very much increased. Some parties have examined it along the coast, and others have passed into the interior of the Greenland continent. To the margin, it is estimated that





ing into the ocean (Fig. 187). As the ice moves into the sea, the buoyancy of the water causes it to break into fragments, which then drop into the ocean and drift away. Carried by the currents, these bergs may pass hundreds of miles from their source; and the Atlantic steamers not uncommonly encounter large icebergs that have been detached from the Greenland glaciers, while upon the shores of Newfoundland these are often stranded. An iceberg is mostly beneath the water; for, in a regularly formed ice block, there are 8.7 parts below the surface of the water for every one part that is above. Therefore if an iceberg of regular form appears 100 ft. above the sea, there are 870 ft. below the surface of



the water for every one part that is above. Therefore if an iceberg of regular form appears 100 ft. above the sea, there are 870 ft. below the surface of



(Fig. 184). But the most remarkable effect, was the production of ice sheets of thoroughly continental character both in northwestern Europe and in northwestern America.

The entire north temperate zone does not seem to have been occupied by a glacier, but there appear to have been several large sheets, one set in Europe and another in America. It is not certain whether these were connected with the Greenland glaciers, but there seems reason to doubt whether there was such a connection. The extension of it





at present. Since no land projects above it, the Greenland glacier is not able to carry moraine material upon its face; and the same appears to have been true of the continental glaciers of the United States and Europe. Like the Greenland glaciers, each of these ice sheets moved from a central region, in case of eastern America apparently in the region of Hudson Bay or Labrador; and as they moved they dragged such material from northern, toward southern regions. When the ice disappeared, much of this material was left, just as would be the case if the Greenland glacier should melt away. As in the Greenland and valley glaciers, the front margin of the

was a place of wastage







FIG. 100

A rounded piece of coal with glacial markings.

are here seen from the (smaller) highlands. The ice





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and these young valleys are narrow, steep-sided, rather like gorges, in which waterfalls are common. We see illustrations of these post-glacial valleys in almost every part of the region occupied by the ice. Side by side we often see the pre-glacial valley, with its broad, gently sloping sides, and the narrow, gorge-like channel of post-glacial origin.



Thus may often be seen in the same valley, the stream in part of its distance occupying its pre-glacial course, and in places being in these post-glacial trenches.

No pronounced line has been the effect

of the ice in the direction of the flow of the stream, but the ice has been the cause of the formation of the gorge.

The ice has been the cause of the formation of the gorge, and the stream has been the cause of the formation of the gorge.

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CHAPTER XVIII.

THE COAST LINE.

General Statement.—The seaward is a place of constant change, for how a very slight movement in the land registers itself distinctly in the outline of the shore. Materials are being brought by various agents and deposited in the sea; and along the shore line there are ever-acting forces

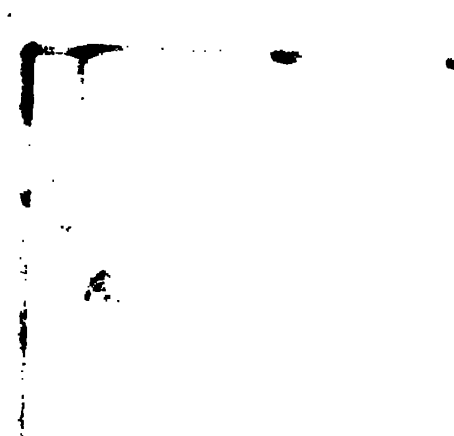




made forms which have been partly submerged from the sea. Figure III, representing a part of this coast, is a particularly good illustration of these irregular



The coast of southern Maine illustrates the same type, and on the same coast, not rarely, a Maine familiar in direction, but from New York to Florida, there are at least instances of the same effect of land and



Florida, is being built outward by the accumulation of sediment that the waves have not been able to dissolve over the sea bottom. This sediment is brought to the shore by the rivers, and is piled by the waves into sand banks or bars; and these bars extend as long islands parallel to the coast (Fig. 134), being separated from the mainland by shallow basins of water in which salt marshes are often present.

Effect of Waves and Currents.—On exposed coasts, the





size and position. In some places, where the direction of the currents is favorable, permanent bars, or spits, are built out from the land (Fig. 186). Sometimes they are narrow, and such sand bars are known as hooks (Fig. 187).

According to the conditions under which they are working, there is a very marked difference in the action of these oceanic agents. On exposed headlands which jut into the sea, the action of waves is violent, and the coast line is uni-





cannot be maintained; and where a hard rock is crossed by a less durable one, the coast is rendered irregular (Fig. 120).

While these peculiarities of coast line may be found developed in many parts of the earth, the tendency of the



waves and currents is to render the coast line always more regular. The rocks are worn by the waves from the headlands and drifted into the bays, which they tend to fill. In the course of time, if



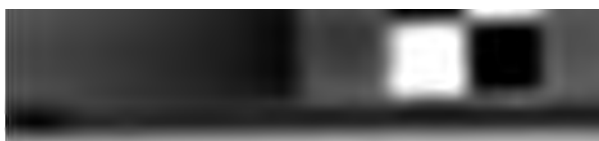






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at the southern end of Florida (Fig. 290). In the sea
ocean, particularly in the South Pacific, the coral grow
form ring-like islands, which are known as atolls (Fig. 291).
Sometimes these are nearly perfect rings, enclosing an
of water which is connected with the sea by a small opening.
The atoll rises above the level of the sea to a height ad-
equent for the growth of trees, and many of these islands
inhabited by man. The reason for their elevation above
sea is the washing action of the waves, combined with the









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cutting of waves (Fig. III), of the building of bars and
 hooks (Fig. IV), of the formation of beaches (Fig. V),
 and indeed of nearly all the phenomena of the seaboard.
 Since many lakes are nothing but river valleys that have
 been dammed through some agency, both islands and capes
 are often produced. Those occur where the current
 irregularities existed on the side of the valley which has

been filled with
 water. When
 there were no
 streams in the
 stream which the









Since plateaus are elevated above the general level of the country, they are often very deeply carved by river incision. Some of the most remarkable cases of deep, narrow river valleys are found among high plateaus. Nowhere is this better illustrated than in the high plateau of Utah in Arizona, through which is cut the remarkable cañon of the Colorado (Fig. 142 and Plate 29). In this respect also there is a difference between plateaus and low plains; the





from the southern end of South America to the northern part of Alaska.

A set of rock beds forming a great mountain system generally known as a system. The Rockies form a system of mountains, and several systems combined form a cordillera (Fig. 129). This is illustrated in the western part of the country, which is crossed not only by the Rocky Mountains







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Between mountain ridges and chains, there are often longitudinal valleys of considerable size, extending parallel to the chains between which they occur. These are among the striking features of mountains, and they are generally occupied by streams which are evidently too small to have carved such immense valleys. When the rock structure is studied, it is evident that these valleys represent either down-folled portions of the crust, or also portions







Figure 1. A view of the rocky coastline from the boat. The boat is visible in the water between the two rocky outcrops.





other danger than that coming from occasional volcanic eruptions and earthquake shocks. The crust of the earth is not covered, but is filled with domes. This is so even when the rocks break instead of bending. Faults representing the breaking of the rocks along certain planes are even now in process of formation in various parts of the world.

If we examine a section of a mountain, we find the strata extending from the earth on either side of the city (Fig. 225); but their extension into the air has been pre-

vented by a
vertical line.





growth; for if mountains are killed so more rapidly the streams are able to cut their channels, then their growth must be remarkably moderate. Since there are other possible explanations for these transverse valleys, we must consider this explanation as merely an hypothesis.



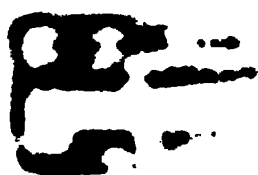
Likewise, we can explain the existence of these transverse valleys, which are so common in mountainous regions, by the fact that the growth of the mountains is very slow, and the cutting of the valleys is rapid, which then cuts across the mountains.



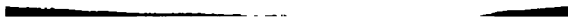
peaks low in elevation, the ridges are worn down, the streams have chosen the softer layers for their valleys, and the aspect of the mountains has become quite changed. This is the stage which has been reached by the Appalachians. These mountains were once much higher than now; and since they have long been exposed to the destructive action of weathering and erosion, they have lost their ruggedness and are now

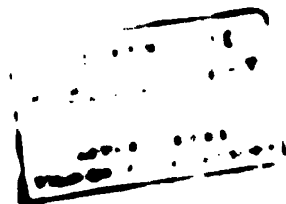














was imprisoned within it, while the molten rock rises beneath the surface of the earth. Besides these, there is also a large quantity of other substances, chiefly gases, such as hydrogen, chlorine, sulphurous gas, etc.

Some of the steam passes into the air as vapor, but much of it falls to the earth near the volcano, producing very hot rains, and often causing deluges in the neighborhood of the cone. During an eruption there are often violent thunder

storms, in which the rain is large and violent. These are





that before they have been able to fall, they are blown by the wind currents to a considerable distance from the cone. In the very violent eruption of Krakatau, in the Straits of Sunda (in 1883), the finer particles of volcanic ash ascended so high into the air that they did not entirely reach the earth for a year or two. It is estimated that the fragments reached a height of 50,000 feet; and this ash in the upper layers of the air drifted over the earth in the prevailing winds, creating fall



that remains in the air for a long time.

The ash that falls from the volcano is called volcanic ash.



1883 there were signs of activity in the volcano, and there it resumed until August, when occurred the most remarkable eruption of recent times. One half of the cone was entirely blown away (Fig. 255); and where the high volcanic cone existed, there is now deep water in place of a part of the island. There are numerous other instances of violent eruptions, and in Iceland these are not at all uncommon.

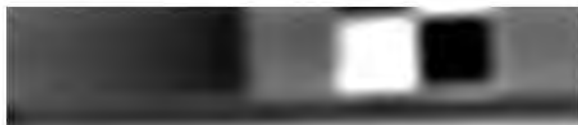
Many volcanoes have violent eruptions at one time, at other moderate action. This was the case with Taormina





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Violent eruptions tend to destroy the perfection of a cone; and in the case of Krakatoa, the volcano was split into two parts, one of which disappeared into the air (7).





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the *Levee of denudation* arise upon the cone and wear it away. At first the regularity of the cone is flattened by the gullying action of streams (Figs. 217 and 218), then its size decreases, and finally merely a *remnant of a cone*. This remnant is always that of the central part of the cone, partly because this is the divide and hence less exposed to









the time immediately preceding volcanic eruptions, earthquake shocks are very common, being apparently the result of unsuccessful efforts of the lava to force its way to the surface. As the rocks are broken apart, each sliver in its progress toward the surface produces a jar. When sufficient





begin eruptions like the other geysers of the Park. While hot springs are very widely distributed, geysers are quite uncommon. There are only three places in the world where they are found in importance, one being the Yellowstone Park, the second in Iceland, and the third in New Zealand. In all of these cases, the geysers are bringing to the surface





CHAPTER XXI

THE TOPOGRAPHY OF THE LAND.

General Statement.—Land forms are of two kinds: (1) those that have been built by some agency and (2) those that have resulted from the combined action of building and carving. By far the greater number of land forms are of the last origin, and there are few that have reached their



Some parts of the earth are now being built up, others being worn down by one cause or another. As a result this, the surface of the earth presents most complex features but if we look at the causes and influences that are at work it becomes a much more simple task to account for the same. These may be briefly summed as follows: The crust of the earth is in movement, in some places upward, in others downward, here by land uplift or downsliding, there by the local and intense upthrusting or downthrusting which accompanies mountain growth. Some regions are therefore usually high, others low; some are mountainous, others plain and still others plateau. *Population is concentrated*





of this, the land surface presents many dissimilarity. Under uniform conditions, denudation affects rocks differently according to (1) their elevation, (2) their position, and (3) their structural features. Moreover, the intensity of denudation varies; and as a result of these facts, land forms differ from place to place. It is impossible here to enter on this subject in any considerable detail; but some of its main principles may be briefly stated.

Much depends upon the ease with which materials may be



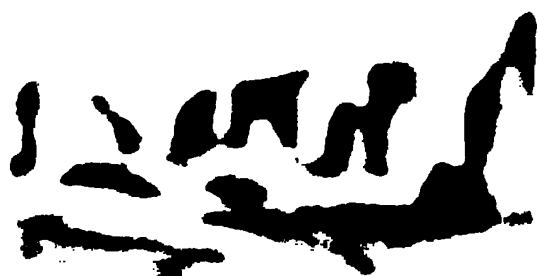


Colorado (Figs. 221 and 222) with the Appalachians or Adirondacks (Figs. 203 and 204).

With conditions of acidity, the soil covering is well removed from the rocks, so that they are exposed to the air and hence, here also, angularity and ruggedness of topography prevail (Figs. 122 and 142 and Plates 29 and 20). 1700 times the stream cannot carry the material furnished

them, and hence
of remaining
highlands. 18
flow into the
base of a stream





rocks is taken advantage of by the waves, and the sea places indicated by an indentation in the coast. When the rocks are jointed or broken, or where one layer is softer than another, sea caves (Fig. 126), chasms (Figs. 126 and 127)

and even small bays, may be produced. The cliffs are not so high nor so angular as the massive rocks (Figs. 12 and 124); but, built by the sea and by weathering, they are caused to crumble and to become a more gentle slope.





is typical of plateaus, and particularly of those in arid lands. On the western, the tendency to produce a step-like contour exists where the horizontal rocks outcrop in cliffs composed of layers of different hardness.



FIG. 106.

Effect of hard layers (marked with dots) in the denudation of nearly horizontal areas.

With gently dipping rocks, very nearly the same kind of topography is produced; but the flat-topped areas are less distinct. In passing across a country in which the hills





form of the coast differs entirely according to the direction of the dip. If the waves beat against a section of country sloping toward the sea, they produce a gently-sloping shore, whose form and position are determined by a local bay (Fig. 250). On the other hand, if the dip is away from the sea, the waves beat against a bluff (Fig. 251.)

When the strata are inclined at a high angle, the fact





progress; that the land forms are still changing; that have been different in the past; and that the future find them different still. Some forms have reached stages, and some another; but all are developing along their lines of a more or less definite nature, notwithstanding the fact that the conditions are complex, and are undergoing change themselves. Any intelligent view of the earth's surface must be made with these facts in mind.

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been so galled that it is unfit for cultivation. A part of Mississippi has been transformed to a barren waste of clay, the features of which resemble those of the Bad Lands of South Dakota (Plate 21). The effect of the absence of forests is well illustrated in the acid lands, where the forest covering is absent because of natural climatic conditions. Here every rain gullies the land, and on the steeply sloping hill-sides, the removal of the soil by rain and wind action has exposed the bare rock (Figs. 99 and 121).













CHAPTER XXIII.

ECONOMIC PRODUCTS OF THE EARTH.

Soil. — The crust of the earth furnishes to man most of the material which he needs for life and comfort. It yields to him the food which he eats, and upon this crust the plants which furnish us with clothing and shelter are raised.





Since we cannot enter into a discussion of these, it will be necessary to confine ourselves to a statement of what seems to the author to be the most probable explanation. Without doubt, different coal beds have had a very different history. Some represent the drifted fragments of wood that have been deposited in an ancient bay or estuary, and then buried beneath marine deposits. Then if the Helderberg delta should be consolidated into rock and be elevated, the would be coal seams formed where rafts of logs have been stranded.

There also seems to be no doubt that some coal beds are nothing more than swamps which were formed either







Colorado, which leads in the production of silver and lead, and is second in the production of gold; and Montana follows, leading in the production of copper, and second in the output of silver. The east excels in the production of non-metallic substances, and the west in metals.

This astonishing mineral wealth has, in no small degree, been responsible for our development as a nation; and there are still great undeveloped stores. There seems to be almost no limit to the possibilities in this direction, and our Indian territory promises to add to this wealth. Nature has been most prodigal in bestowing her favors upon this country, for she has given us nearly all that man could require: good



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very much as water turns a turbine wheel and causes it to revolve. By means of a series of wheels, each revolution of the movement is recorded, and this may be transmitted by electricity to some place where an automatic record is kept in miles per hour.

Measurement of Evaporation. — The measurement of evaporation is made in inches of water evaporated from a surface exposed to the air. Almost any dish can be used, and the scale of inches is marked upon it; or the measurement may be made with a graduated scale. Since the rate of evaporation varies with the temperature, it is best to attempt to include natural conditions as nearly as possible, though this is almost rarely done. The best way is to place the evaporating pan in a still body of water, allowing it to float on the surface. There are many contrivances for obtaining a continuous record.

Measurement of Moisture in the Air. — The measure of the moisture



knowledge of the changes that have occurred in the past, and knowing what changes are liable to follow, predictions of greater accuracy are made, in some cases for several days in advance. In many respects these predictions are of great importance; but in still to that result of the work, we are rapidly obtaining much valuable information concerning the air. We are also obtaining many facts with reference to the general climatic features of the country, and of the world. In these directions much has been done, and much more is being done; for, as we know more about the air and its behavior, we may not expect to obtain more accurate predictions.

Upon a weather map (Fig. 40) the wind direction is plotted by the use of a series of arrows pointing in the direction toward which the air is blowing. The temperature is also plotted upon them, and lines of equal temperature, or isotherms, are drawn across the country. The pressure of the air is also graphically shown on the maps by a series of



superior to this in many respects. A contour is a line of equal elevation. It is the line to which the sea would rise if the land were depressed to the depth represented by the height of the line. If we imagine ourselves near the seashore, the mean line is then the contour line of 10 and the 10-foot contour line is that to which the sea would reach if it were raised just 100 feet.

The contour map (Figs. 136, 138, 139, and Plate III) is made upon a horizontal scale which varies in different cases. In this country the usual scale is one inch to the mile; that is, every mile of country is allowed one inch. No allowance is made for the vertical character of the country. Thus if a region of considerable irregularity is being mapped, an inch on the sheet is made to represent one mile in a horizontal direction. We can make upon the side of a hill, and look across a valley to another hillside of the same elevation, and a mile distant.





SUGGESTIONS TO TEACHERS.

In the preparation of this book, the endeavor has been to make the subject in a purely descriptive manner. Nevertheless, the best way to learn physical geography is not to read about it, but, so far as is possible, to work out the points for one's self. Not merely does the discovery method teach the subject better, but it makes the interest of the student in a far more valuable way than in those merely by rote.



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fiend on the wind, temperature, and pressure. Such a study will create a real live interest, and make the students observers of the things of every-day occurrence, as well as train their minds in the habit of drawing logical conclusions from a series of observed facts.

CHAPTER V.—The study of cyclones and anticyclones cannot come aid from the daily weather maps. On these the student will see the time and size of the areas, their rate and direction of progression, the nature and distribution of rainfall, the direction of the winds, their spin tendency, the cold-front whirling, etc. He will observe how the winds change from day to day, and what relation they bear to the areas of high and low pressure. He can predict the changes and study them in connection with the weather of his own immediate neighborhood. The storm paths and their intensities can be studied with the aid of the Monthly Weather Reviews. From the weather predictions we





power of observation and arouse their interest; and the *teacher* must make this the basis upon which to build a real understanding of the action of rivers. The key to success in this direction is to tell the student only so much as is absolutely necessary, but to make him tell the story, not from memory of what the book says, but upon the basis of a series of observations which necessarily lead to these conclusions.

It is not necessary to find illustrations of all phenomena in the field, though the more the better; but the object is to teach the student how to see for himself, so that he may use other illustrations whenever he happens to come upon them. Where it is not feasible to study the phenomena in the field, photographs or lantern slides make a fair substitute.

COURSE. XIV.—With a set of Physical Maps¹ of the continents, there is opportunity for study of the greater features of the land. These are most easily shown upon a relief globe.² The illustrations



the fact that the *Journal of the American Medical Association* (JAMA) has been the most influential journal in the field of medicine for over a century. The JAMA has been the primary source of information for physicians and the general public alike. It has been the primary source of information for the medical profession and the general public alike. It has been the primary source of information for the medical profession and the general public alike.

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The Earth. — What reasons have we for believing that the interior is highly heated? What is the probable condition of the interior? What are the movements of the earth? What are the perturbations of its revolution? What is the mass of the masses?

The Moon. — What are its movements? What is its period? Why is one side of the moon never seen from the earth? What are the probable conditions on the moon?

Comets, Shooting Stars, and Meteors. — What are comets? How do they move? What is the origin of shooting stars? Why do they glow?

The Stellar System. — What is the probable number and distance of the stars? How are they arranged? What and where are nebulae?

Symmetry of Solar System. — What points of symmetry are noticed? What are the distances between the members? Electrons.

The Nebular Hypothesis. — State it.



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CHAPTER V.

STORMS. Pages 45-106.

Cyclonic Storms. — What is a storm? What are some of the names of storms? What are the two kinds of cyclonic storms?

Hurricanes. Description. — Where do the hurricanes begin? The typhoons? What changes are noticed as the storm moves and passes over a place? What is the eye of a storm? How is the air moving in the storm?

Effects. — What is their effect upon vessels? Upon the coast? How does lightning.

Path. — What is the natural path in the North Atlantic? How do they sometimes diverge from this? What is their path in the Pacific? South of the equator? What is their effect? Where are they most violent?



Distribution of Snowfall. — Where does snow fall? Where are glaciers produced?

Seasonal Distribution of Rainfall. — What is the effect of the position of the belt of rains? How do the seasons affect the amount of rainfall? What is the reason for the winter rains of Washington and Oregon? For the irregularity of rainfall in the east?

Irregularities of Rainfall. — What is the normal rainfall? How does it sometimes vary from this? What are the effects of heavy snowfalls?

CHAPTER VII.

WEATHER AND CLIMATE. Pages 226-236.

Weather. — What is weather? Climate?

Tropical and Arctic. — What are the weather conditions of the tropics?



CHAPTER IX.

FORM AND GENERAL CHARACTERISTICS OF THE OCEAN.
Pages 442-451.

Distribution of Land and Water.—What are the main features of distribution of land and water?

Composition of Ocean Water.—What are the principal ingredients of salt water? How much variation is there in salt impurities? What are the reasons for this?

Color and Transparency.—What is the natural color of the ocean? Why? Are there other colors? What is transparency?

Explanation of the Ocean Bottom.—What reasons led to the belief that animals could not live here? How say the animals under the



warm surface water as shallow? Why are the surface temperatures constant?

Great Currents: Planetary Circulation. — What resemblance is there between ocean and air circulation? What causes are there for belief in a planetary, oceanic circulation?

The System of Ocean Currents. — What is the circulation in equatorial regions? What is the North Atlantic drift? What becomes of the water entering the Caribbean? What is the origin of the Gulf Stream? What is the cause? What is the Labrador current? Briefly describe the general circulation of the North Atlantic. What are the conditions in the Atlantic? What is the circulation of the North Pacific? What is the cause? What is the circulation of the South Atlantic? What is the main feature of the oceanic circulation?

Causes of Ocean Currents. — What causes are there for belief in



most important? How are the mechanical sediments formed? How are they associated? What are the kinds? How do they differ?

Deposition of Sedimentary Rocks.—In what position are they deposited in the ocean? What is the origin of stratification? What are characteristic deposits in the sea? What are the characteristic secondary rocks on the land? What does this prove? How thick are sediments? What does this prove? What is an unconformity?

Consolidation of Sedimentary Rocks.—How are rocks cemented? How are they metamorphosed? What are the common rock masses?

Geological Chronology.—What is the condition of the rock mass? What are fossils? How has a record of early life been obtained? What does this show? Can the age be told by fossils? What is the difference between age and stage? What do the names of the geological periods really indicate? What does the name Carboniferous mean? How



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CHAPTER XVI.

DELTA, FLOODPLAIN, WATERCOURSE, AND LAKE. Pages 395-405.

Delta.—Where are delta deposits made? What is the alluvial fan? What conditions favor delta formation in the ocean? Why are lakes favorable places for them? How does the river flow over the delta? What are distributaries? How does the delta grow?

Floodplain.—Where are these found? What causes flooding among mountains? What is the most common cause for flooding? How may they escape into deltas? What effect would be produced by filling the land? From changes of climate? What are the characteristics of floodplains? What is the source of the stream? What are other sources? How are the floodplains raised? How does the flood plain material come down stream? What is the effect of the floodplains?



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How far are volcanoes? Have they occurred in all parts of the world?

Materials Erupted. — What substances are erupted? What is the source of power? What are the effects of the cones? What is a mud flow? How does the lava flow move? What is the nature of the ash? How does this differ from ash? What was the effect of Krakatau?

Eruptions of Volcanoes. — How do these vary as to violence? Contrast the eruption of Krakatau with those of the Lipari Islands. What is known of Vesuvius? In the Hawaiian Islands? What kinds of volcanoes are the most violent? What are the three groups?

Form of Cones. — How does a volcano grow? What tends to destroy the cone? Where are they steepest? What is their angle of slope? How do lava and ash cones differ?



Island? When reached, why was its settlement relatively easy? What caused the development of the far west? What has determined the position of the towns of New England? What relation is there between the location of the country and the surroundings?

CHAPTER XXIII.

MINERAL PRODUCTS OF THE EARTH. Pages 426-436.

Soil.—What is its origin? Its value?

Building Stones.—What is the origin of granite? What other stones are called so granite? What are the metamorphic building stones? What is the origin of slate? Of marble? What are the causes of metamorphism? What are the sedimentary building stones? How abundant are they? What other mineral substances are used for building? What?



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